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**Forestry projects: lessons learned and implications for
CDM modalities**

OECD and IEA Information Paper



FOREWORD

This document was prepared by the OECD Secretariat in May 2003 at the request of the Annex I Expert Group on the United Nations Framework Convention on Climate Change. The Annex I Expert Group oversees development of analytical papers for the purpose of providing useful and timely input to the climate change negotiations. These papers may also be useful to national policy makers and other decision-makers. In a collaborative effort, authors work with the Annex I Expert Group to develop these papers. However, the papers do not necessarily represent the views of the OECD or the IEA, nor are they intended to prejudice the views of countries participating in the Annex I Expert Group. Rather, they are Secretariat information papers intended to inform Member countries, as well as the UNFCCC audience.

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Executive Summary

A wide variety of potential afforestation and reforestation (A/R) project types could be initiated under the Clean Development Mechanism (CDM). These range from small-scale agroforestry projects with multiple climate, environmental and socio-economic benefits to the local population, to large, commercial monoculture re/afforestation projects whose primary focus is on producing wood or wood products from plantations.

The concern that A/R activities undertaken under the CDM should include multiple potential benefits, rather than aiming to maximise solely carbon sequestration, has led to agreement of a number of principles governing their acceptance. These include the Kyoto Protocol stipulation that CDM project activities should contribute to achieving sustainable development and the principle outlined in the Marrakech Accords (MA) that A/R activities should contribute to the conservation of biodiversity and natural resources. Modalities and procedures for including A/R in the CDM are due to be agreed at COP9 in December 2003.

This paper examines different aspects of several A/R projects currently underway, including how the concepts of additionality and leakage have been considered, and how baselines have been calculated. The paper attempts to identify trends and draw lessons from this experience that could be useful when agreeing on the modalities and procedures for including A/R projects into the CDM during the first commitment period.

The paper also briefly assesses the limited experience since agreement of the Marrakech Accords with implementing the MA definition of additionality for emission reduction CDM-type projects. This experience indicates that some project developers interpret the definition of additionality for emission reduction projects as “if the proposed project activity had not been implemented, a less GHG-friendly project activity would have been initiated in its place”. This interpretation does not question whether or not the proposed project is a likely baseline scenario. Given the current large-scale business-as-usual A/R activities in many non-Annex I countries, using a similar definition for A/R CDM projects – without any further screens or criteria - could lead to free-rider projects generating credits possibly up to the level of the cap agreed for A/R CDM credits in the first commitment period.

The definitions agreed for additionality, baselines, baseline approaches and leakage in the Marrakech Accords for emission reduction projects will need to be modified to some extent in order to be applicable to A/R projects. Moreover, any definitions agreed for A/R projects will either need to be broad enough to be applied to the gamut of eligible A/R activities, or separate definitions will be needed for different project types.

Issues that may need to be taken into account when agreeing a definition of additionality for A/R CDM project activities are that:

- these activities are often implemented on a large scale under business-as-usual;
- they can result in both carbon uptake and GHG emissions; and
- changes in carbon stocks and uptake rates can be naturally-occurring.

Revising the definition of additionality for A/R projects to take these factors into account would require additionality tests or screens as well as assessing a project's additionality by comparing its performance

with the project's baseline. A revised definition could help to reduce the number of free rider projects by putting the onus on the project developer to indicate why their project activity is additional.

Given the variety of potential A/R project types, locations and participants, there is likely to be no single, simple adequate "test" to determine whether a particular project is additional and meets biodiversity and sustainability criteria (as for emission reduction projects). However, preliminary indications are that a mixture of non-carbon, non-financial and objectively-verifiable criteria could be used to develop such screens. Alternatively, different project types could be subject to different additionality screens, depending on whether they were high, medium or low-impact. In either case, further work would be needed, e.g. to develop appropriate additionality screens.

The definition of baseline for A/R project activities may also need to take into account that naturally-occurring changes in carbon stocks and uptake can take place on a project site. It may also need to reflect that A/R activities can increase emissions on the project site and that the baseline should not be defined in such a way as to allow projects to generate credits for LULUCF activities that are not A/R. If the baseline for a project indicates that the pre-project land-use (and associated emissions) is displaced, the impact of this activity displacement should be considered under leakage provisions.

Identifying the most likely prospective land use (and associated carbon stocks and emissions) at the time the project starts could be a promising approach in defining a project baseline. This approach would need to be worded carefully to ensure that such a definition does not allow credits to be generated for ineligible A/R activities or for natural regeneration.

There are several different possible types of leakage that could occur in forestry projects. These can be at the local, national, regional or global scale, positive or negative leakage, be easy or difficult to quantify, and be more or less significant compared to the GHG mitigation effect of the project activity. Leakage that could occur at the regional or global scale is not under the control of the project developer, and would be difficult to assess, quantify and verify. However, some potential types of leakage are under the control of the project developer and could be identified and managed at the outset. These include activity displacement, incomplete accounting and temporal leakage.

Thus, many types of leakage can be reduced or eliminated by appropriate project design and/or implementation. For example, the causes of local activity displacement could be addressed and/or their magnitude estimated, all carbon pools that decrease (and emission sources that increase) could be included in the project's baseline, and the crediting lifetime of the project could start at the time of site preparation and planting. Indeed, some of the A/R projects currently underway have made significant efforts to design the project in order to reduce these types of leakage. However, only one project has quantified the potential leakage effects (at 5% of total carbon uptake). Further developing such calculation methodologies would be helpful to ensure consistency and transparency.

This paper has highlighted the potential risk of significant levels of free riders for CDM A/R projects. This risk can be significantly reduced by incorporating relatively small changes into the definitions of additionality, baseline and baseline approach for A/R CDM project activities that are set to be agreed at COP9. The importance of leakage can be reduced through careful project design and siting. Doing this would help to ensure the environmental integrity of the A/R CDM without burdening the projects with excessive costs.

1. Introduction and context

According to the timetable set by the Marrakech Accords (MA), definitions and modalities for including afforestation and reforestation (A/R) projects under the Clean Development Mechanism (CDM) in the first commitment period are to be agreed in December 2003 at COP9. While the MA indicate these decisions and modalities will “reflect” the COP7 decisions on emission reduction CDM projects, there will need to be some differences to reflect the different nature of forestry CDM projects. This is because forestry projects lead to carbon removals rather than emission reductions and because carbon stock changes can be naturally occurring (as well as human-induced). Moreover, the MA indicates that the definitions and modalities for forestry CDM projects will need to take “into account the issues of non-permanence, additionality, leakage, uncertainties and socio-economic and environmental impacts”. It also affirms that several principles, including that the implementation of land use, land-use change and forestry (LULUCF) activities undertaken under the Kyoto Protocol “contributes to the conservation of biodiversity and sustainable use of natural resources”.

Preliminary discussions on forestry-related CDM issues have been held at the UNFCCC workshop in February 2003, based on a UNFCCC options paper (UNFCCC 2003a) and Parties made subsequent submissions to the UNFCCC, summarised in UNFCCC 2003b. This paper focuses on three of the issues covered in the workshop and submissions: determining additionality, calculating baselines and assessing leakage.

The “modalities and procedures” agreed at COP7 for emission reduction CDM projects include definitions of the terms additionality, baseline and leakage. They also include three approaches for determining baselines for emission reduction CDM projects. It is therefore likely that the definitions and modalities to be agreed at COP9 for A/R CDM projects will also include definitions for the same terms. However, the proposed definitions of afforestation and reforestation for A/R CDM projects (UNFCCC 2003b) leave room for a wide variety of potential project types and scales. The modalities to be agreed at COP9 will need to be general enough to cover all potential project types while allowing for subsequent development of methodologies at a more disaggregated level. Alternatively, a two-track approach could be followed whereby agreement is reached on a sub-set of project types and general modalities are agreed for the remainder.

In setting up these definitions and modalities for forestry CDM projects, negotiators may also wish to take into account the project development experience, both from implementing the COP7 decision for emission reduction CDM projects and from preparation of CDM-type A/R forestry projects.

Section 2 of this paper gives a brief overview of selected LULUCF project activities currently underway. Sections 3, 4 and 5 outline experience gained by A/R projects to date on additionality, baselines and leakage, and outline options from this experience on how they should be defined and implemented.

2. Outline of LULUCF project activities to date

There is a relatively limited, albeit growing, number of climate mitigation projects in the LULUCF sector. These include four afforestation and five reforestation projects initiated under the pilot phase for activities implemented jointly (AIJ), two initiated under the World Bank's Prototype Carbon Fund (PCF), as well as several CDM-type projects that have not yet (or may not ever) seek to generate GHG credits under the Kyoto Protocol.

This section outlines the main characteristics of the A/R components of GHG projects currently underway. Examining projects already developed can help provide insights into the type of project activities that may be brought forward under the CDM, and issues that may therefore be relevant in assessing additionality, calculating baselines and determining leakage. Many of these project activities were initiated before the agreement at COP7 that only afforestation and reforestation activities could generate credits under the CDM and so also include components such as avoiding deforestation that would not be eligible to generate CDM credits during the first commitment period. The analysis of these projects focuses on the A/R components and/or on projects indicating that they will be submitted as CDM projects.

Table 1 outlines the key characteristics of some selected LULUCF project activities currently underway for which relatively detailed information was available to the author. Further information on these projects is presented in Tables 3-6 and Figures 1 and 2. Most of these projects occur in potential CDM host countries (in particular in Latin America) although one of the PCF projects is in Romania, and the SaskPower project is in an Annex II country.

There is a wide variation in almost all aspects of the projects. The scale of GHG benefits from the different projects varies greatly, from single large-scale project activities (e.g. Plantar, Peugeot projects), to small-scale projects that have been "bundled" together under a single umbrella (e.g. Guaraqueçaba, Scolel Té). The biodiversity aspects of the different project activities also differ markedly. Many activities examined were dominated by re/afforestation activities in plantations of one or two species (e.g. Romania, SaskPower, Plantar, SIF) that were not always native (e.g. Plantar, SIF). However, other project activities, particularly those aimed at forest regeneration, were considerably more bio-diverse. For example, the Peugeot project involved planting 30 species (29 of which are native species) and the Sumitomo project involved planting six (including both native and exotic species).

The commercial nature or otherwise of project activities also differs. Some of the project activities are commercial activities initiated or continued because of the availability of carbon credits (e.g. SaskPower, V&M, Kilombero). Other project activities are aimed more at promoting carbon sequestration and sustainable LULUCF practices by local, small-scale farmers (e.g. Guaraqueçaba, Scolel Té). Still other projects are purely environmental projects not seeking either financial or GHG-credit returns (e.g. Peugeot).

The financing and institutional set-up of projects also varies enormously, although private companies have been involved to a greater or lesser extent in most of the project activities examined. Project developers for activities that have been set up to date include private companies, national or provincial governments or agencies, financial organisations, inter-governmental organisations, both environmental and research non-governmental organisations and, independent non-profit organisations. Private sector companies who would benefit from credit revenues as well as any non-credit outputs of the projects have financed and/or developed some projects (e.g. Kilombero, Plantar). Both private and environmental non-governmental organisations (ENGO) or research/independent non-governmental organisations (RINGO) actors are involved in other projects, e.g. Peugeot and Guaraqueçaba, where the project finance is wholly or mainly from the private sector actor, but the project was designed in co-operation with NGOs. PCF projects, run

by the World Bank, are financed both by selected Annex II governments and private companies. The independent non-profit organisation FACE¹ has also been involved in a few projects.

Sources of funding have also been mixed, and include direct inputs from national and/or provincial governments, indirect inputs from governments and companies (e.g. through the Prototype Carbon Fund), as well as funds from financial organisations, IGOs, non-profit organisations, and even ODA (for an AIJ project, Scolel Té).

There is little data on the cost of GHG mitigation through A/R actions, partly because cost data, e.g. for AIJ projects, bundles together both the A/R and forest preservation components. Moreover, for some early projects, such as those undertaken as part of the US initiative on joint implementation, not all costs were reported, which means that the estimates of costs per ton CO₂ are underestimates (Turekian 2003). However, the data that is available indicates a large range in potential carbon sequestration costs. A few of the projects estimate costs at under \$6/t CO₂. This includes \$1.48/t CO₂ for the Klinki project - excluding revenues from the sale of wood, (UNFCCC 1998), \$3.6/t CO₂ for the PCF Romania project (PCF 2002c), \$3.5/t CO₂ for forest regeneration and \$5.8/t CO₂ for reforestation in the Scolel Té project, excluding opportunity costs (PlanVivo 2001). However, the Sumitomo reforestation and forest regeneration project in Indonesia estimated much higher carbon abatement costs of \$68/t C (\$249/t CO₂)² (Sumitomo Forestry Co. 2001, Ministry of Environment 2001).

¹ This organisation was originally financed by the Dutch electricity generator SEP.

² This high estimate includes \$1.5m costs incurred in the first two years of the project for acquisition of authorisation and initial payment of ground rent, and annual expenditure of \$330,000 for investor personnel costs (in Japan) and \$50,000 for building and maintenance of forest roads.

Table 1: Key characteristics of A/R components of selected LULUCF project activities

Project name, location, type	To apply GHG credits?	Size (ha)	Many sites?	Expected benefits* (kt CO ₂)	Project characteristics (A/R component only)	Is harvest expected? Who benefits?
Guaraqueçaba (Brazil), --	Yes	713	Yes	85.2	Reforestation with native species, enhancement of secondary forests, agroforestry (and other components)	Partial (sustainable forest management)
Kilombero (Tanzania), --	Yes	12121	No	9365#	Re/afforestation (unclear in project documentation) with 75% pines, 25% eucalyptus	Yes (project developers/operators).
Klinki (Costa Rica), AIJ	Not clear	6000	Yes	7216	Reforestation of marginal farmland and pasture to commercial tree plantations (mainly with 1 species)	Partial (for use in long-lived wood products)
Peugeot (Brazil), --	No	10000	No	7320	Re/afforestation (unclear in project documentation) of purchased farmland with 30 native species	No
Plantar (Brazil), PCF	Yes	23578	No	4545.4	Reforestation with monoculture plantations (98% of area), assisted regeneration (2% of area)	Yes (100%). Project operator.
PROFAFOR (Ecuador), AIJ	Not clear	23102	Yes	2490#	Reforestation of grasslands to create "natural forests" (30% native species), and plantations (maximum 50% of area).	Partial (with replanting planned).
Romania, PCF	Yes	6728	Yes	1900#	Afforestation of degraded agricultural land: 51% monoculture plantations, 41% plantations with two species, remainder reforestation.	Yes on some sites – others to remain unharvested.
SaskPower (Canada), GERT	Yes	3300	No	191.2	Reforestation with monoculture plantations on lands harvested 1965-1990	Yes (after end of project life)
Scolet Té (Mexico), AIJ	Not clear	3588	Yes	588.1	Reforestation (through planting of pine, cipres and oak) and assisted regeneration (fencing of areas) of currently degraded open pine forest	Yes. Local farmers.
SIF, (Chile), AIJ	Not clear	3100	n/a	625.6	Afforestation with monoculture plantations (both pine and eucalyptus) on degraded agricultural land (pasture)	N/a
Sumitomo Forestry (Indonesia), --	Yes	10000	n/a	3746	Reforestation of degraded forest with six species to create sustainable industrial forest plantations, regeneration of degraded forests	Partial

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V&M (Brazil), (potential CDM)	Yes	n/a	No	31400#	Restocking plantations as they are harvested to generate “large areas of sustainably managed plantations”. Credits are generated by using plantation harvest as energy source instead of a fossil fuel (coke).	Yes (100%) - project operator.
Viet Nam/ Australia, AIJ	Not clear	5	No	646.6	Afforestation to increase availability of genetically improved planting stock. Benefits assume all seed successfully planted in additional A/R activities (but no plans/funding for this included in AIJ project activity).	No (seed trees), assumed not for remainder.
Virilla (Costa Rica), AIJ	Not clear	1000	Not clear	274.7	Reforestation of pasture with native species to create tree plantations.	Yes

The number of credits generated by the project is lower than the expected benefits of the project.

* Over the project lifetime.

Source: GERT 2002, PCF 2002a and b, Brown and Delaney 2001, SVPS and TNC 2002, UNFCCC 2002b, 2001, 2000, 1998, Golodet pers. comm, SGS 2000a and b, Ecoscurities 2002, Jara 2002, Ministry of Research 2002, PlanVivo 2001

3. Additionality

The Marrakech Accords effectively define “additionality” for emission-reduction CDM projects by specifying that “A CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity”. Negotiators will need to decide by COP9 what, if any, amendments should be made to this definition for sinks projects.

Ideally, “additional” A/R CDM project activities would meet several criteria. They would:

- increase net carbon sequestration compared to what would have happened otherwise;
- would not have gone ahead (or not in their proposed form) in the absence of the CDM;
- do not result in increased deforestation (or decreased carbon removals) elsewhere; and
- contribute to sustainable development, e.g. via local socio-economic benefits such as increased employment, income or access to non-timber forest products such as heart-of-palm, resins, honey or fruit..

The wider environment and development role that forestry activities and the CDM can play is recognised in both the MA and the Kyoto Protocol. The Protocol stipulates that the CDM shall assist in achieving sustainable development, while the MA also includes governing principles for A/R activities that indicate they should be undertaken in such ways as to “contribute to the conservation of biodiversity and sustainable use of natural resources”. These wider goals of A/R CDM projects will need to be met for individual projects to be eligible under the CDM. However, these concerns need not be included as part of the definition of additionality, but could be incorporated in different parts of the decision on LULUCF in the CDM (UNFCCC 2003b).

3.1 Current state of A/R activities

Although significant amounts of deforestation occur in many non-Annex I countries, some of these countries also have large reforestation and afforestation programmes that were put in place well before the Framework Convention on Climate Change or its Kyoto Protocol was agreed. These A/R activities are undertaken by both public and private bodies, with public and private funding, and for economic, energy, and environmental reasons. These policies have offset carbon losses from deforestation to a greater or lesser degree and include establishing new forest plantations (as well as other activities such as forest regeneration, establishing non-forest plantations etc.). Table 2 outlines the total forest cover and establishment of new forest plantations globally, and for countries where the latter is 50,000 ha/y or greater³.

³ These are FAO data, using FAO definitions. The definition of forest, afforestation and reforestation as they apply to CDM A/R activities are also due to be agreed by COP9. Different definitions of “reforestation”, particularly with regard to the period that a particular area must not have contained forests, could potentially have a significant impact on the annual forest plantation area that potentially qualify as a CDM-eligible project activity.

Table 2: Total forest cover and average annual establishment of new forest plantations in selected non-Annex I countries

Country	Total forest area 2000** (‘000ha)	Annual forest plantation area* (‘000 ha)	Total forest cover change 1990-2000 ** (annual rate of change, %)
India	64,113	1,508	0.1
China	163,480	1,153.8	1.2
Indonesia	104,986	270.7	-1.2
Thailand	14,762	225	-0.7
Brazil	543,905	135	-0.4
Argentina	34,648	126	-0.8
Chile	15,536	85	-0.1
Peru	65,215	50	-0.4
Uruguay	1,292	50	5.0
Venezuela	49,506	50	-0.4
Total (all NAI countries)	2,177,192	4500	-0.5

Source: *FAO 2000, ** FAO 2001. Total forest cover change = re/afforestation - deforestation

Table 2 shows that business as usual activities results in over 4.5 million hectares being afforested or reforested in non-Annex I countries each year, although deforestation activities more than offset A/R programmes in some countries. The total plantation area of non-Annex I countries in 2000 is 126.7 million ha (FAO 2001). Thus, in the absence of CDM projects, China’s forest cover has almost doubled in 50 years, and Uruguay’s forest plantations have increased from 87 k ha to 590 k ha between 1992 and 2000 (Baethgen 2003).

If A/R programmes continue at their current rate, are on eligible lands, and if all BAU activities apply for CDM status, they could result in approximately 890 million tons of CO₂ (approximately 6.5% of Annex I CO₂ emissions in 1990) being sequestered between 2003 and 2012⁴. Of course, since these removals would have happened anyway, these projects are not additional and therefore should not generate credits. However, if the only criterion for determining additionality was that A/R activities sequestered more carbon than would otherwise have been sequestered without the proposed CDM project activity, BAU A/R activities could be judged as additional⁵.

The Marrakech Accords do specify a limit to the total amount of CERs that could be generated via LULUCF CDM project activities, in part because of concerns about the potential level of free riders. Each Annex I Party can use CERs from LULUCF project activities up to the level of 1% of its base year emissions times five. This limit means that current Annex I Parties to the Kyoto Protocol, plus Russia – where ratification remains uncertain - are allowed by the Marrakech Accords to use up to 424.1 million tons of CO₂ of credits from CDM A/R activities to offset domestic emissions. However, in reality some BAU re/afforestation activities are likely to take place on land not eligible for CDM status and not all project activities are likely to apply for CDM status. This will reduce the level of potential “free-riders”

⁴ This assumes a sequestration rate of 8 t CO₂/year for China and 15 t CO₂/year for all other countries from the third year after planting (and zero growth in the first two years), that project activities starting before 2003 will not seek CDM status, and that the average tree is planted 3 years after the start of the project.

⁵ However, if ex post analysis indicates that A/R projects undertaken in the first commitment period are in fact additional, there may be a reduced rationale for imposing a 1% cap on such efforts for subsequent commitment periods.

from its possible level of 890 million tons CO₂. Nevertheless, the problem of free-riders could potentially be significant.

3.2 Assessing additionality for selected A/R projects

Table 3 summarises how selected A/R project activities outlined additionality in project documentation. Although most project documentation explain why the project is additional, two use the project baseline to both assess and quantify additionality.

Project developers have also used financial and economic arguments to explain why several other projects are additional. These range from the simple, e.g. stating that the project would not be profitable without carbon finance (e.g. V&M project) to detailed financial analysis of several different land-use scenarios (e.g. Romania project).

An analysis (Tipper et al. 2002) of eight current A/R project activities indicates that three of the largest projects outlined in Table 1⁶, may not actually be additional if judged against two different multi-criteria additionality tests that include assessing legal requirements, need for incremental investment and socio-economic benefits. Subak (1999) assesses the AIJ project in Virilla in detail, and indicates that it would only qualify as additional “under selected definitions”, and not, for example, if it was required to improve on historical plantation establishment.

Moreover, despite strong concerns being raised as to the additionality of some potential CDM projects, some of them have been verified as GHG-mitigating projects. For example, the Kilombero forestry project, generating almost 9.4 mt CO₂ over 99 years, has been verified as an additional, GHG-reducing project (SGS 2002a). The Plantar project has also been verified as a project that generates emission benefits, although with some reservations, “largely due to the uncertainties associated with the eligibility and permanence of the carbon sequestration claimed by the project” (DNV 2001). (However, neither of these projects is officially approved as a CDM project.)

3.3 Experience with implementing the Marrakech Accords’ definition of additionality for emission reduction projects

The Marrakech Accords’ definition of additionality for emission reduction CDM projects can be interpreted in different ways, e.g.:

- 1) that no emission reductions will occur if the project is not both implemented and registered as a CDM project activity (i.e. that the project would not be implemented in the absence of the CDM);
- 2) that if the proposed CDM project activity was not implemented, a less GHG-friendly project activity would have been initiated in its place.

The second interpretation differs from the first in that it does not question whether or not the proposed CDM project activity would have gone ahead anyway. This interpretation could allow non-additional but GHG-friendly activities being eligible to generate credits under the CDM.

⁶ Including the Kilombero and Plantar projects.

Table 3: Documentation on additionality for selected A/R projects

Project	Treatment of additionality
Guaraqueçaba	<ul style="list-style-type: none"> Persuasive argument based on historical land-use trends: deforestation is continuing, so it is unlikely that lands currently used for pasture will be reforested.
Kilombero	<ul style="list-style-type: none"> Comparison to project baseline: more C is sequestered in the with-project than without-project case. (No details given)
Klinki	The project documentation does not indicate why the project is additional.
Plantar	<ul style="list-style-type: none"> Persuasive argument based on land-use trends: harvesting and abandoning plantations is becoming more and more common in project area. Financial argument: C revenue needed to make the project sufficiently profitable.
PROFAFOR	<ul style="list-style-type: none"> Location of project chosen to avoid sites that are wooded. (The project verification document does not indicate why the project is additional.)
Romania	<ul style="list-style-type: none"> Financial analysis and persuasive argument: very little afforestation occurs under BAU and afforestation would not be financially attractive without carbon revenues (even though the host country has a policy of afforesting 25,000 ha/y and the state-owned project developer and operator has access to sufficient funds set aside for the purposes of i.a. afforestation and reforestation).
SaskPower	<ul style="list-style-type: none"> Persuasive argument based on land-use trends: no reforestation has occurred to date, and therefore the project is additional.
Scolec Té	<ul style="list-style-type: none"> Economic arguments: carbon finance provides the capital needed to implement the project
SIF	<ul style="list-style-type: none"> Persuasive argument: there are few potential land uses for degraded lands other than sheep farming, which is unprofitable in project area. Financial argument: carbon finance provides funding for project.
Sumitomo	<ul style="list-style-type: none"> Rational/economic argument: project is a case study. Similar projects are unlikely to be undertaken under BAU as it would not break even for at least 19 years (assuming a carbon price of \$20/t C).
V&M	<ul style="list-style-type: none"> Economic argument: project would not be profitable enough without carbon revenues. Persuasive argument based on land-use trends: abandoning plantations increasingly common
Viet Nam	<ul style="list-style-type: none"> Persuasive argument: seedling orchards would not be introduced except for the AIJ project.
Virilla	<ul style="list-style-type: none"> Economic argument: carbon finance provides the capital needed for the project.

Sources: As for Table 1

It could be argued that this second interpretation has been used for a few of the larger GHG mitigation projects that have been put forward since agreement of the Marrakech Accords. For example, a 120 MW and 86 MW hydroelectric project in Panama and a 200 MW hydro plant in Uganda have been submitted by project developers (to CERUPT) as additional projects (AES Panama 2002a and b, AES 2002), even though construction was already well underway at the time. Together, these projects are expected to generate more than 11 million CERs. CERUPT rejected one of these projects (the 200MW Bujagali project in Uganda) and accepted the two Panama projects. Similarly, two already-operational charcoal-based steel plants in Brazil have been put forward as potential CDM projects that could generate 30 million CERs to remain as charcoal-based plants⁷ (Ecosecurities 2002, PCF 2002a).

⁷ The baseline for these projects assumes a baseline fuel switch from charcoal to coke.

The environmental NGO CDMWatch has identified 39 projects seeking, or planning to seek, CDM status by April 2003 (CDMWatch 2003). These projects are expected to generate more than 95 million CERs. CDMWatch has raised concerns about the additionality of 20 of the 39 projects, which together account for 28.2 m CERs or 30% of the credits expected to be generated by the 39 projects⁸. Thus, 70% of the credits from projects examined to date have not raised additionality concerns.

Negotiators will therefore need to decide if a definition of additionality that results in this potential level of free-ridership is acceptable, and if not, how to define and implement additionality for forestry CDM projects in such a way to reduce likely levels of free-riders. Negotiators will also need to decide whether, given the special features of LULUCF projects under the CDM, screening tests to remove non-additional projects are desirable *before* baselines are defined.

3.4 Defining additionality for forestry CDM project activities

Experience with both emission reduction and sink enhancement projects outlined above has shown that it can be difficult to distinguish additional and non-additional projects using the current definition of “additionality” in the Marrakech Accords. The question then arises as to how the “additionality” concept can be implemented in practice for forestry CDM projects. If this is to follow the format of the modalities and procedures for emission reducing CDM projects, there will be one decision that includes a definition of additionality for A/R projects. However, it is difficult to come up with a single definition that is broad enough to encompass the variety of potentially additional forestry projects while also limiting the numbers of free-rider projects. The remainder of this section examines what such a definition could look like. However, there are other options that could be worth exploring, such as separate definitions and/or additionality “tests” for different A/R project types.

There are three main ways to modify the definition of additionality for emission reduction projects to include language that would explicitly allow A/R projects to be eligible for the CDM. The advantages and disadvantages of these definitions will be examined in turns:

- 1) **Minor word changes** can be made to the definition of additionality for emission reduction projects to allow for the fact that A/R projects sequester carbon.
- 2) **Small modifications** could be made to the definition to clarify that areas which would have been re/afforested anyway are not counted as additional, thus reducing free-riders.
- 3) **Other criteria** can be incorporated into the definition of, and potentially “tests” for, additionality.

Since baselines and additionality are linked, some of the options to reduce free riders could be implemented as part of the additionality assessment for a project, and/or as part of quantifying the baseline. However, some options - notably the treatment of biodiversity or other environmental aspects of the project - would be difficult to incorporate into a GHG baseline, and so may best be addressed via the additionality “route”.

⁸ However, it is not clear what criteria are being used to make the assessment of additionality or whether these are consistent between different projects. For example, CDMWatch classify the Plantar project as non-additional, but have not indicated any additionality concerns about the similar V&M project.

3.4.1 Minor word changes to current additionality definition

The additionality definition adopted for emission reduction CDM projects could be edited slightly in order to apply it to sinks projects. A possible definition of additionality could therefore read along the lines of that suggested in the UNFCCC Options paper on baselines (UNFCCC 2003a) and taken up in several subsequent country submissions (UNFCCC 2003b⁹), e.g.:

“An afforestation or reforestation project activity is additional if the net enhancement of sinks is higher than that which would have occurred in the absence of the registered CDM project activity”.

This definition mirrors that agreed for emission reduction projects, and might exclude sequestration from natural regeneration from qualifying as an eligible CDM project activity. However, this definition’s similarity to that for additionality for emission reduction CDM projects means that it too could be interpreted in more than one way, e.g. “that the net enhancement would not have occurred if the CDM project activity was not implemented and registered” or “that the project activity results in net enhancement of sinks”. Since this latter interpretation is the *raison d’être* for forestry project, this text could therefore lead to large amounts of credits being generated by “free riders”, although the CDM-associated transaction costs should mean that many BAU activities (particularly those relatively small in scale) will not apply for CDM status.

3.4.2 Small modifications to reduce “free riders”

As indicated above (Table 2) BAU activities result in large amounts of land being re/afforested in non-Annex I countries, even in countries where net deforestation is occurring. These A/R activities are undertaken by a variety of actors in the public and/or private sector and for a variety of reasons. Thus, while (globally) 48% of forest plantations are “industrial plantations” that supply raw material for industry, 26% of forest plantations have been initiated for economic or environmental benefits such as fuelwood, soil and water conservation (with the driver behind the remaining 26% is unspecified) (FAO 2001).

Some countries have large areas of both industrial and non-industrial plantations: China and India have 37 million and 12 million hectares (ha) of industrial plantation areas, and 8 million and 21 million ha of non-industrial forest plantations respectively. The ownership of both industrial plantations and non-industrial plantations can be public or private, and the proportion varies by country.

The magnitude of BAU A/R activities is significant. Credits from free-rider A/R project activities could generate up to the “cap” on A/R credits in the first commitment period if all BAU A/R activities were eligible for CDM status and claimed credits. This is because A/R activities are currently widespread and undertaken both on larger and smaller scales, and they are inherently GHG-friendly (as long as they do not result in deforestation elsewhere). By comparison, inherently GHG-friendly emission reduction CDM possibilities are either rarely carried out as BAU (e.g. non-hydro renewable electricity) or where potential sites are few (e.g. hydro electricity). Thus, greater additionality “safeguards” for A/R activities may be justified compared to, say, emission reduction CDM project activities.

Reducing the level of free riders could be done in different ways. One alternative is to modify the definition of additionality in the modalities and procedures for A/R projects to include reference to appropriate assurances against free-riding. This has been suggested by some Parties (UNFCCC 2003b). Alternatively, an indication that project developers will need to explain to the project verifiers why the project is additional and not the baseline scenario could be added elsewhere in the decision on modalities and procedures for A/R projects and/or in the CDM project design document for LULUCF projects.

⁹ These submissions differ slightly, e.g. whether to refer to anthropogenic removals or net anthropogenic removals.

This could translate into text such as:

“An afforestation or reforestation project activity is additional if the net enhancement of sinks is higher than those that would have occurred in the absence of the registered CDM project activity, and if the project activity itself is not a likely baseline scenario”.

Such a definition of additionality would put the onus on the project developer to indicate not only that the project activity results in increased carbon sequestration, but that the project activity would not have occurred in the absence of the CDM. This could be done by different means (and could be left open for project developers to choose), e.g.:

- Outlining in the form of a “persuasive argument” why the project activity would not have gone ahead otherwise;
- Providing other qualitative indications why the project activity would not have gone ahead anyway, e.g. indicating that the project has overcome barriers of some sort;
- Providing quantitative indications that the project activity would not have gone ahead anyway.

The “persuasive argument” approach has been used in indicating the additionality of some AIJ, PCF and other climate-projection forestry projects (Table 3). It involves a project developer explaining why the project activity would not have gone ahead otherwise. While this is a subjective assessment, it would be relatively easy to verify for countries where BAU activities follow a clear pattern, particularly if qualitative indications of why the project activity would not have gone ahead anyway were given as well as a “persuasive argument”. For example, in Uruguay 96% of BAU plantations involve the planting of one of four species (*Eucalyptus grandis*, *Eucalyptus globulus*, *Pinus taeda*, *Pinus eliotii*) in large-scale plantations on old farmland purchased by foreign forestry companies (Loisel 2003). On the other hand, this focus on intent – particularly in any countries where the pattern of BAU A/R activities is less clear – is neither transparent nor easily verifiable, and is therefore open to misuse.

Negotiators will need to decide whether this sort of tool, although imperfect, would be enough to reduce the potential numbers of free-rider A/R CDM projects¹⁰. (A similar clarification for emission reduction projects is included in the baseline section of version 01 of the CDM Project Design Document (UNFCCC 2002d), where project developers are asked to explain “how and why [the] project is additional and therefore not the baseline scenario”.)

A more rigorous approach would be to provide detailed assessments as to why the project activity is additional, e.g. comparing current A/R rates to that proposed by the project. This has been done for an A/R

¹⁰ In practice, the current shortage of potential verifiers for forestry projects means that the capacity to validate and verify potential CDM projects is both limited and expensive, as potential verifiers are distant from potential project sites. This reduces, in the short term, the potential number of free rider A/R projects that could be verified. However, lack of verifiers may not continue, and should not be relied upon to ensure the integrity of forestry-based credits generated under the CDM.

project underway, i.e. the Romania PCF project¹¹. However, this approach would only work in countries where the proposed project activity is relatively large compared to current A/R rates¹².

Alternatively, project developers could provide other detailed information – such as that asked for to indicate why a small-scale emission reduction CDM project activity is additional (UNFCCC 2002e). This can be done with qualitative information, e.g. outlining that there are organisational, institutional, awareness or other barriers to implementing the project that have been overcome, or with quantitative information, e.g. the financial returns of the project with and without CDM credits.

An indication of “financial additionality” is not required for emission reduction CDM project activities, and is unlikely to be made a requirement for LULUCF CDM projects. In fact, it has been argued that this criterion has significant shortcomings in terms of its practical implementation (e.g. OECD/IEA 2000, WBCSD 2000), as it can rely on confidential data and subjective profitability criteria. Nevertheless, constraints on the amount of A/R activities in many non-Annex I countries are more likely to be financial/economic than the availability of suitable sites (e.g. Boer 2002). “Financial additionality” has therefore been used either to make the additionality argument, or to back up that argument, for some potential CDM A/R projects. As an optional tool, outlining any financial barriers faced and how a particular project activity has overcome them may therefore be helpful for project developers and/or for validators as part of their assessment of the additionality of forestry CDM projects.

3.4.3 Incorporating non-GHG criteria into the definition of additionality

One of the two options for additionality, as identified by the UNFCCC “options paper” on baselines, additionality and leakage (UNFCCC 2003a), is to include non-GHG, indeed non-environmental, criteria into the additionality definition. This reflects submissions by e.g. China, Malaysia and the EU on modalities on how to include A/R into the CDM (e.g. UNFCCC 2002c, UNFCCC 2003b).

Incorporating non-GHG concerns into the definition of additionality for A/R CDM projects could result in text such as:

“Additionality exists if the net enhancement of sinks resulting from an afforestation or reforestation CDM project activity goes beyond legal requirements or commercial practice”.

Text such as this would make it obligatory to incorporate one or more non-GHG considerations into an assessment of additionality, such as:

- legal requirements (e.g. prescribed land use for the particular area of land on which the project activity is situated, or for land owners/farmers) and/or
- “Commercial practice” (e.g. BAU industrial plantation activities and/or requirements, such as required financial returns, land-use or soil quality prior to the A/R activity).

¹¹ For example, in the PCF Romania project, the average afforestation rate over the previous 10y is 345 ha/y (varying between 127 and 766) and the project plans to afforest 6728 ha. The project therefore clearly goes beyond any yearly variation in historical afforestation rates.

¹² The annual variation in re/afforestation rates in countries such as India, is likely to be larger than the size of an individual A/R project activity. In such cases, it would be difficult to determine whether or not a project is a “free rider”. While it is possible to set the baseline for a project to include relevant re/afforestation rates (e.g. an average of x% p.a. of land suitable for A/R has been afforested in the last y years), this downward adjustment would still allow free rider projects to generate (100-x)% non-additional credits.

This approach for assessing additionality has been rejected for emission reduction CDM projects (at the international level), although such requirements could be applied by individual host countries in order to grant approval for a project.

Moreover, putting the onus on the project developer to prove that their project goes beyond legal requirements or commercial practice could be both difficult and costly. In particular, financial “commercial practice” criteria are difficult to “test” because they are subjective and rely on data that may be confidential and/or easy to manipulate (e.g. information such as required rates of return)¹³. Furthermore, commercial practice in industrial plantations often aims at maximising timber output (rather than necessarily balancing these concerns with those of sustainable development and biodiversity). Thus, including a requirement to sequester more carbon than industrial plantations would probably be in contradiction to aiming to take sustainable development and biodiversity concerns into account. Even assessing whether legal requirements have been met could be subject to difficulties, e.g. if verifiers have to assess legal documents in languages they are not fluent in, or if legal requirements are laid out in vague terms such as of taking “reasonable” steps to accomplish or avoid certain actions.

“Softer” criteria could also be used to indicate whether or not a project is likely to be additional. These criteria include:

- Policy indications (e.g. those set by central or local governments on A/R rates that are not legally binding);
- Local/social issues (e.g. demand for non-timber forest products, urban planning, multiple use criteria) in project design and implementation.
- Biodiversity issues (e.g. whether the project activity contributes to increasing biodiversity).

Difficulties can also arise in assessing whether a particular project activity goes beyond current policies, as they are not always implemented on time or enforced efficiently. Other criteria such as whether local stakeholders have been involved in project design and implementation, and whether their needs are better met in a with-project or without-project scenario may be more objectively verifiable - but are not by themselves necessarily indications of additionality.

3.4.4 Discussion on additionality for A/R projects

Table 2 illustrates the magnitude of BAU A/R activities. It also highlights that using as a single criterion “more carbon is sequestered with the A/R project than in the absence of the A/R project” could lead to BAU A/R activities generating as many credits as the 1% cap by 2012. Thus, it may be interesting to examine whether one or more non-GHG characteristics of a project could be used to provide insights into whether or not a particular project is additional. If negotiators agreed that this was a desirable approach, such non-GHG characteristics could form the basis for further screening criteria to be applied prior to defining the baseline. Some of these non-GHG characteristics are outlined in Table 4.

Table 4 illustrates the variety of some of the non-carbon characteristics of projects currently underway. Almost all the projects examined were planning to harvest the trees planted, so whether wood or wood products are a planned project output is unlikely to be a good additionality screen. (On the other hand, if no harvest is planned for a large proportion of the project area, the project may be additional.) Likewise, there

¹³ However, as noted in the section above there may also be more objective patterns of commercial practice, such as type of plantation.

is no correlation between the size of a project (i.e. the scale of individual A/R sites) and whether or not harvesting is expected.

Assessing whether or not the project has been encouraged by C finance is difficult, as it depends on financial information and criteria which are not always presented in project documentation. Moreover, the majority of projects explicitly indicate that they would not have gone ahead if they could not generate GHG credits for the project at some point in time. For example, one AIJ project (Scolel Té) has sold “proto-carbon” credits in order to obtain seed funding. However, some projects have been implemented before claiming additionality. It is thus unclear how carbon finance was in fact a determining factor in making the project operational. Assessing whether or not the project complies or exceeds with legal requirements is also difficult for the projects examined in this paper, as it is not mentioned explicitly in project documentation for most projects, and would require independent assessment and research.

Given that CDM A/R projects are meant to have positive effects on biodiversity as well as carbon sequestration, the potential of using biodiversity characteristics of the project as a means for determining additionality could also be examined. The biodiversity characteristics of proposed CDM A/R projects vary widely. Some involve establishing “natural” forests (Table 1) while others establish sometimes large areas of monoculture plantations of not-necessarily native species. The Centre for International Forestry Research (CIFOR) has developed forest biodiversity indicators, including those on the complexity and heterogeneity of forest structure and the number of forest-dependent species (Newton and Kapos 2002). However, relying solely on biodiversity criteria may cause difficulties, as “describing biological diversity on the local or national scale for most countries may not be entirely possible” (CBD 2001), and therefore quantifying improvements in it would also be difficult.

Determining the eligibility of a proposed CDM project activity based on its other environmental impacts could be equally problematic. How would a project that decreases soil erosion but also water availability be assessed? Relying on Forest Stewardship Council (FSC) or other already-agreed certification could also be difficult. For example, although there are some overlaps, there are also important differences between criteria for FSC certification and criteria for eligibility of A/R activities under the CDM. In particular, FSC certification can be obtained for land which was forested until November 1994 (FSC 2000). Moreover, while FSC criteria for plantations “prefer” ones that are biodiverse, certification is also possible for areas of monocultures. In fact, some of the proposed project activities under the CDM (e.g. Plantar, PROFAFOR) already have FSC certification although for Plantar, 98% of the A/R project area involves monoculture plantations.

However, some patterns that lead to positive outcomes do emerge from Table 4. For example, projects that involve planting several native species have a positive effect on biodiversity, and may also benefit the local population by increasing access to non-timber forest products such as fruit, heart-of-palm, resins, honey etc.¹⁴ Most of the biodiversity-friendly projects have benefited from NGO or RINGO involvement in project development. The very large projects examined in this paper that produce wood, but no - or little - other products, for the benefit of the project developer, tend to have a lower positive effect (or indeed a negative effect) on biodiversity. These projects have also sometimes been identified as having negative environmental/resource-access effects on the local population although they may also create short or long-term employment opportunities.

¹⁴ Projects that involve creating monoculture forest plantations may also improve biodiversity - depending on what the land-use and biodiversity of the project site was before the project. For example, even though the Klinki AIJ project involves planting of mainly one species, the project developer indicates that the project increases biodiversity by “nurturing a new understory with native species” (UNFCCC 1998).

Table 4: Assessing non-carbon characteristics of A/R activities currently underway

Project (see Table 1 for project details)	Project scale#	Output of project:		Encouraged by C finance?*	Benefit from any non-credit outputs accrues to:		Impact on biodiversity	Other envt impacts	NGO RINGO involvement?	Effect on local population**
		Wood etc.	Non-timber forest prods.		Developer	Local				
Guaraqueçaba	n/a	n/a	Yes	+	No	Yes	+++	++	Yes	++
Kilombero	VL	Yes	No	--	Yes	No	-	-	No	--, +
Klinki	S-M	Yes	No	- (AIJ)	No	Yes	+	+	Yes	+
Peugeot	VL	No	Not indicated	n/a	No	Yes?	+++	+, -	Yes	+
Plantar	VL	Yes	No	--	Yes	No	+	-	No	+, 0
PROFAFOR	S-VL	Yes	Yes	- (AIJ)	Yes	Yes	+	+	No	+, -
Romania	S-M	Yes	Yes	++	Yes	No	++	+	No	+, -
SaskPower	VL	Yes	No	++	N/a	N/a	+	n/a	No	0
Scolel Té	S	Yes	Yes	++	No	Yes	+++		Yes	+
SIF	M	Yes	No	++	Yes	Yes	+	+	No	+
Sumitomo Forestry	S-VL	Yes	Yes	+	Yes	Yes*	++	n/a	No	n/a
V&M	VL	Yes	No	--	Yes	No	0	0	No	0
Viet Nam	S	No	No	-(AIJ)	No	n/a	0/-	n/a	Yes	0/+
Virilla	S-M	Y	No	++	Yes	No?	++	+	No	n/a

The classification refers to the sizes of individual A/R sites within the project: not the size of the project as a whole. VL = Individual sites >1000ha, L = individual sites >200 ha, M = site between 50-200 ha, S = <50ha
0 = no effect (or no change from pre-project situation), +++ = positive effect (or likelihood), -- = negative effect (or likelihood) (rating based on author's judgement)*Marked as -- if project already underway when registered as a climate mitigation project

** Sometimes effects on the local population can be mixed, such as an increase in employment opportunities, but decreased access to the forest and its products.

Sources: As for Table 1

Assessing additionality based on a mixture of non-carbon and non-financial criteria, such as those outlined in Table 4, may therefore be an option worth examining further for A/R projects. Some of these criteria are strongly linked with the likely GHG additionality of a project. The advantage of such an approach would be that it should increase transparency and consistency, as these non-carbon and non-financial criteria (e.g. type and number of species planted) are often ones that can be verified objectively. However, the very fact that this additionality screen would not be based on GHG performance would make it a fundamentally different approach from that used for emission reduction projects.

Alternatively, it could be possible to have different types of additionality screens for different types and scales of projects. This type of differentiation has been proposed for electricity generation CDM projects (Kartha et al. 2002) and has also been proposed for LULUCF projects (SGS 2002). SGS (2002) classify as “low-impact” projects that produce mainly non-timber forest products from indigenous species, that contribute to increasing biodiversity and that are environmentally and socially sustainable. They also indicate that these projects are likely to be additional as they are not commercially viable and not generally funded by donors (SGS 2002). “High impact projects” would be classified as those producing mainly wood or wood-fibre products from exotic species, and would only be additional if plantations are not generally established in the region in which the project is located, or if the project overcame a specific barrier that would have prevented the project’s development (SGS 2002). This type of assessment could lead to a judgement of “additional” for the Guaraqueçaba and Peugeot projects, and a judgement of “non-additional” for the Plantar and V&M projects.

If this approach is to be used to determine whether a particular A/R CDM project is additional, further work on the classification of “high” or “low” impact projects is needed. For example, the current definitions would not currently indicate how to judge the additionality of several projects examined above (e.g. Klinki, Profafar, Romania, Scolel Té, Sumitomo, Viet Nam). In particular, guidance would be needed for projects that produce both wood and non-timber forest products, use both indigenous and exotic species, that use indigenous species for wood-producing plantations, or that are multi-component projects.

4. Baselines

For emission reduction projects, the Marrakech Accords use baselines to assess whether or not a particular project is additional. For A/R projects, a GHG baseline can be used to quantify the carbon uptake and net GHG effects of a project compared to what would have happened had the project not gone ahead. However, a GHG baseline alone cannot assess whether or not the project would have gone ahead otherwise in a particular area (because of the large volume of BAU A/R activities and even larger area on which they could be undertaken). Nevertheless, a GHG baseline could be used to quantify the benefits of a LULUCF project that has been assessed as additional using other methods, e.g. such as those outlined in the section above.

The Accords define what a baseline is, and outline three approaches that can be used for developing baseline methodologies for emission reduction CDM projects.

As for the definition of additionality (discussed in Section 3), some changes will need to be made to the definition of “baseline”, and “baseline approaches” to those agreed for emission reduction CDM projects in order to render them applicable to forestry projects. This section examines possible options for such and their implications, given experience with developing forestry A/R baselines for AIJ or other climate mitigation projects.

4.1 Experience with baselines used for current A/R projects

Information is available on the baselines some of the A/R projects currently underway, and is summarised in Table 5.

All baselines for the projects examined were expressed either in terms of carbon uptake per hectare (i.e. as C or CO₂ equivalent) or in terms of carbon uptake per hectare per year. Several projects examined (e.g. Kilombero, Profafor, SIF, Scolel Té) have used a simple baseline assessment, i.e. that the land-use and associated carbon stocks would remain unchanged from the time of project implementation to the end of the project’s crediting lifetime. This assumes that natural regeneration will not occur.

This simple projection may be an appropriate assumption for afforestation projects and for reforestation projects where there is no natural seed supply or if germination and growth conditions are not appropriate. However, one of the reforestation projects examined does factor natural regeneration into its baseline assessment (Sumitomo). Thus, assuming natural regeneration will not occur will not always be appropriate. Verifying whether it is an appropriate assumption for reforestation activities can be done objectively by a project-specific assessment.

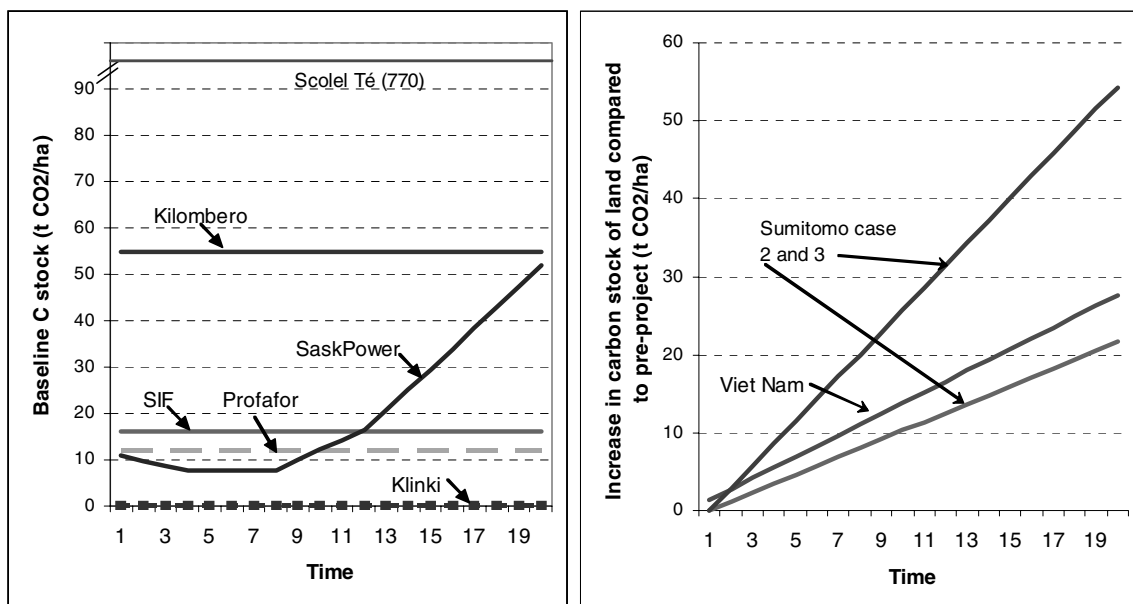
Table 5: Treatment of baselines for selected A/R projects

Project	Treatment of:	
	Baseline	Conservativeness
Guaraqueçaba	1) Constant C stock of land currently used as pasture/shrubs, 8.8 t CO ₂ /ha for pasture, and 27.1 t CO ₂ /ha for shrubs. 2) Natural and assisted regeneration of abandoned pasture.	Given the wide variety in C stocks of sample pasture/shrub plots, a high value was chosen
Kilombero	Continuing use as grasslands with constant C stock (estimated at 44 t CO ₂ /ha)	Baseline value increased to 55 t CO ₂ /ha to account for uncertainty
Klinki	Constant C stock of biomass and soil carbon	The GHG benefits of the project from avoiding a likely decrease in soil carbon, and from the (non-planted) understory are not accounted.
Plantar	Continuing land use trend, i.e. harvest of plantations then abandonment and conversion to agriculture/pasture with constant carbon stocks.	Not indicated
PROFAFOR	Continuing land use as grasslands with constant C stock (12 t CO ₂ /ha)	24.7% of C uptake to be kept in a "buffer" for 99 years to ensure against uncertainties related to establishing/maintaining plantations, calculating baseline, insect attack etc.
Romania	Assessment of : 1) most likely land use scenario 2) comparing to current land use. Result: continued low-quality grazing (pasture).	Model projections include 10% discount for possible losses through drought etc.
SaskPower	Decrease then gradual increase in C stocks - modelled with CO2FIX. Control plots outside plantation area will be used to check model outputs.	Total amount of carbon reduced to account for risk of fire and insect damage.
Scolet Té	Constant carbon stock of 210 t C/ha (770 t CO ₂ /ha)	Not indicated
SIF	Constant carbon stock of 16.28 t CO ₂ /ha on currently degraded lands.	Not indicated
Sumitomo	3 baselines set up reflecting types of land on which project will occur: low-biomass sites, degraded secondary forest, secondary forest.	Value of C accumulation in forests reduced to account for risk of forest fires.
V&M	No baseline for A&R component of project was developed.	(Credits are only claimed for the displacement of coke with plantation-produced charcoal).
Viet Nam	Constant rate of carbon sequestration of afforested areas (assumed at a 10 m ³ /ha/y, equating to 17.4 t CO ₂ /ha/y).	Not indicated
Virilla	Constant rate of carbon growth in planted species (14.85 t CO ₂ /ha/y).	Excludes carbon accumulation in soils.

Sources: As for Table 1.

The actual baseline level varies significantly, even for projects that involve planting the same species (Figure 1). These differences reflect site-specific differences in carbon sequestration rates and potentials as well as different choices on which carbon pools to include and exclude from the project's baseline.

Figure 1: Baselines used for selected A/R projects



Sources: As for Table 1

* Note: X axis not to scale: different time periods used for different projects (where specified).

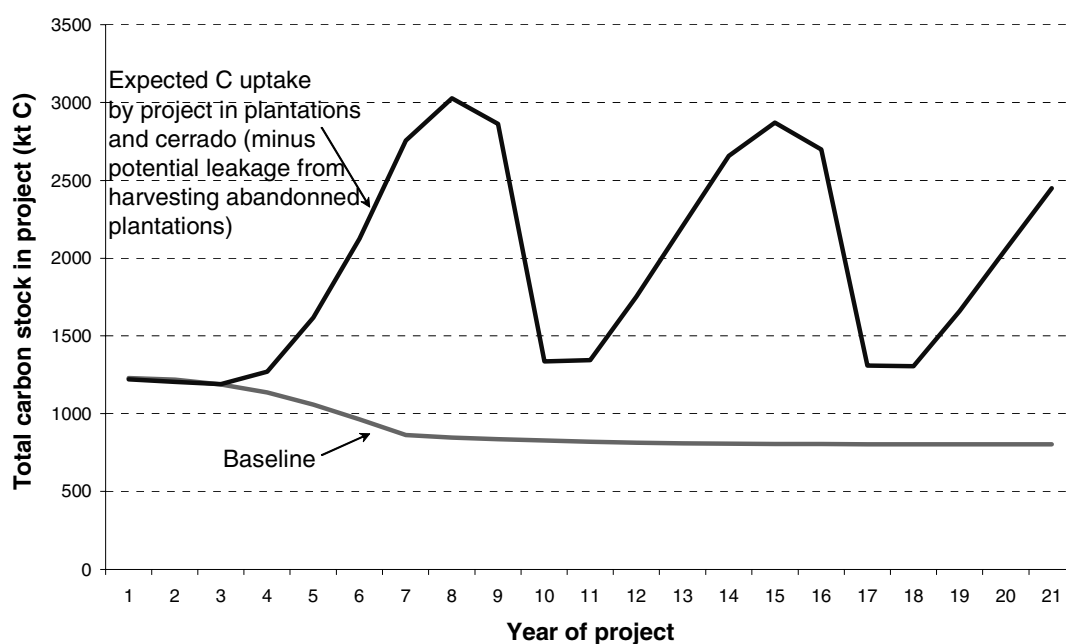
While several projects will or are using models to estimate the carbon sequestered by the project (e.g. Romania, SaskPower, Scolel Té, SIF), only the SaskPower project used a model, CO2FIX, to calculate the project baseline. The SaskPower project is also planning to check the validity of the baseline via measurements from control plots outside the project area.

The baseline for some projects assumes that current land-use trends will continue. These trends for one project (Plantar) are to harvest existing plantations and then abandon the land to pasture/cattle ranching. This trend results in the baseline decreasing sharply over the first few years of the project (Figure 2).

A baseline that decreases due to anthropogenic reduction in carbon stock, i.e. through harvesting without replanting, clearing existing vegetation, natural degradation, could effectively allow projects to generate credits from activities that are neither afforestation nor reforestation (unless the anthropogenic reduction is also assumed in the with-project case¹⁵). This would therefore not be consistent with the eligibility of LULUCF CDM project activities as agreed in the Marrakech Accords, even if such a baseline would “reasonably represent” carbon sequestration in the absence of the project activity.

¹⁵ The Plantar project assumes that harvesting and abandonment of existing plantations will occur in the project scenario, and deducts these possible leakage emissions from the carbon expected to be sequestered in the new plantations set up by the Plantar project.

Figure 2: Plantar project: estimated baseline and projected uptake



Source: Data from PCF 2002a

4.1.1 Approaches used to determine baselines for A/R projects

Assessing experience with baseline development for A/R projects can be summarised as:

- The general approach used by different project developers to developing baselines for A/R projects has been broadly similar, but
- The C stock levels of the baseline has varied significantly.

The general approach used has been to:

1. Identify current land-use/land-use trends and associated carbon stocks of the project site.
2. Assess likely future land use without intervention.
3. Calculate carbon stocks of likely land use over project life.

In order to account for the fact that only human-induced changes should generate emission credits under the CDM, and that only A/R activities are eligible for the CDM during the first commitment period, further steps are likely to be needed for CDM projects. These are to:

4. Assess whether there are any emissions associated with the baseline land use, and, if so, calculate them. Emissions could come from livestock (e.g. if the project site was used for pasture), the soil¹⁶ and/or the operation of agricultural machinery.
5. Assess whether these activities will be displaced elsewhere as a result of the project, and if so, include these emissions as part of the leakage adjustment discussed in section 5.
6. Identify whether natural regeneration is likely to occur on the project site, and if so, incorporate the associated increase in carbon stocks to the baseline; and
7. Ensure that the baseline chosen will not result in credits being generated for ineligible activities. (This could be done simply by excluding from the baseline any reduction in carbon stocks that would be brought about via anthropogenic degradation).

Thus, unless natural degradation is expected to occur on a project site, the carbon uptake for an A/R activity should not drop below initial values of carbon uptake. Where natural regeneration is expected to occur, the carbon uptake baseline should increase.

Previous analysis undertaken for the AIXG (Tipper et al. 2000) indicated that site-specific data should preferably be used when calculating the initial stock of carbon, as climatic conditions, site conditions, species planted and site management can all significantly affect the carbon content of different forests. This analysis also indicated that both socio-economic indicators and land suitability should be examined when assessing the most likely land-use for a project site, as they are important determinants of what land-use is. These factors can also vary considerably from site to site.

4.2 Defining “baseline” for A/R projects

The Marrakech Accords define a baseline for emission reduction CDM projects as “*the scenario that reasonably represents the anthropogenic emissions by sources of greenhouse gases that would occur in the absence of the proposed project activity. A baseline shall cover ... all gases, sectors and source categories ... within the project boundary*”. Several Parties have suggested possible modifications to this definition for A/R CDM project activities (UNFCCC 2003b).

The main differences among these suggestions are whether the baseline should consider both anthropogenic and natural removals¹⁷; whether to consider just sinks, or both sinks and sources; and whether to include just carbon/carbon dioxide or all GHG.

In order to ensure that A/R CDM projects only generate credits that reflect the net GHG impact of the project (i.e. human-induced sequestration minus human-induced emissions) the definition of baseline would need to reflect that:

- forestry projects result in carbon removals;

¹⁶ Deforestation causes a gradual loss in soil carbon levels. Thus in theory soil carbon levels could still be decreasing in areas which are reforested. However, this decrease is most significant in temperate forests during the 10 years following deforestation (Paul et al. 2002). Thus, decreasing levels of soil carbon are not likely to occur in CDM project sites as they are tropical, and have been deforested since before 31 December 1989, assuming this definition is kept for CDM projects.

¹⁷ There is no equivalent to natural regeneration for emission reduction projects, e.g. the GHG intensity of electricity will not improve and/or fuel changes will not occur in the absence of deliberate human intervention.

- changes in carbon stocks and emissions can occur on project land in the absence of any project, e.g. through natural regeneration¹⁸ or degeneration, or through deforestation;
- implementing forestry projects can also result in changed levels of anthropogenic emissions of CO₂ or other gases.

However, a definition including the factors above would not question whether the project activity would have gone ahead under BAU, so an additionality “screen” is also likely to be needed.

The definition of a baseline for A/R projects may be lengthy, as it may need to include references to what would have happened in the absence of the project activity and in the absence of the CDM, GHG removals and emissions, and CO₂ and non-CO₂ gases. Thus, in order not to further complicate any text on modalities and procedures, it may be worthwhile keeping separate text outlining the baseline definition and baseline methodologies/ approaches.

The definition of a baseline for A/R projects could also be used to reiterate that credits should not be generated by ineligible LULUCF activities. This is because the Marrakech Accords limit eligibility in the first commitment period to A/R projects. However, in theory CDM project activities could include those that reforest areas that already contain trees or other vegetation that are likely to be harvested or degraded by the proposed project activity. Some Party submissions (UNFCCC 2003b) indicate that the baseline should be allowed to include a scenario in which anthropogenic removals are projected to fall below (or anthropogenic emissions from sinks are projected to rise above) current levels. This issue is reproduced for a stylised project in Figure 3.

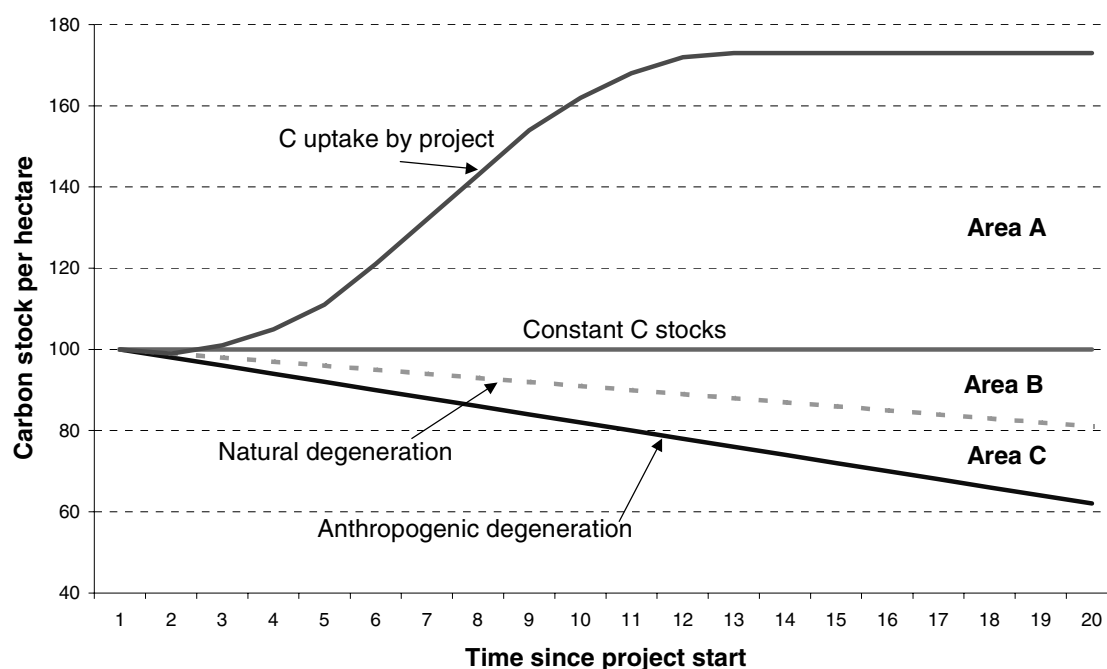
Figure 3 represents a reforestation project occurring on land that is being degraded both as a result of natural and anthropogenic activities (and assumes no emissions are caused by the project). If the baseline used assumes that the most likely prospective land use continues, e.g. natural and anthropogenic degradation - the credits generated by project would be the sum of areas A + B + C, even though C represents credits from an activity that is neither afforestation or reforestation¹⁹. If the baseline assumed only natural degradation occurred, the project would generate A + B credits, whereas if the baseline assumed a constant carbon stock it would generate the least amount of credits, equivalent to area A. Because of the potentially large scale of projects, the difference between the options can be significant.

Defining the baseline in such a way as to reiterate that only A/R activities can generate CERs in the first commitment period could be done by including wording such as “the baseline shall not reflect reductions in carbon stock due to anthropogenic degradation”. Alternatively, ensuring that only A/R activities can generate credits could be done by incorporating similar wording when defining appropriate baseline approaches for A/R project activities (see below).

¹⁸ There is no equivalent to natural regeneration for emission reduction projects, e.g. the GHG intensity of electricity will not improve and/or fuel changes will not occur in the absence of deliberate human intervention.

¹⁹ If an A/R CDM project activity does take place on a site where deforestation or human-induced degradation is expected to occur in the absence of the project, some or all of these deforestation activities could be displaced elsewhere. Some or all of the emissions associated with this deforestation would therefore presumably need to be subtracted from the project benefits (via the provisions on leakage).

Figure 3: Defining baseline for A/R projects



4.3 Defining appropriate “baseline approaches” for A/R projects

As well as defining what a baseline is, the Marrakech Accords also outline how a baseline “shall be established” for emission reduction CDM projects and lay out three “approaches” that can be used when choosing a baseline methodology (see Appendix A). These three approaches allow developers of emission reduction CDM project activities significant flexibility when deciding how to calculate the baseline for their project activity, as which of these approaches is chosen can have a large impact on the level of baseline and therefore the number of credits generated by an emission reduction CDM project. There is substantial overlap between the issues that need to be considered when establishing a baseline and defining appropriate baseline approaches. This section will examine both these issues.

The baseline approaches laid out in the Marrakech Accords are:

- (a) existing actual or historical emissions;
- (b) emissions from a technology that represents an economically attractive course of action ...; and
- (c) “the average emissions of similar project activities undertaken in the previous five years, in similar ... circumstances, and whose performance is among the top 20 per cent of their category”.

Modifications are needed to these approaches in order to be able to apply them to forestry A/R projects. Decisions are also needed on whether all three approaches should apply.

Suggestions for modification (UNFCCC 2003a and b) include:

1) Minor word modifications to the three approaches, to take into account that A/R activities result in carbon removals (and may also affect emissions). However, these modifications would not take into

account that changes in emissions and removals could occur naturally. Thus, this approach could result in project activities being able to generate CERs from natural regeneration without human intervention.

2) Deleting the third approach. The phrase “and whose performance is among the top 20 per cent of their category” is not likely to be applicable to forestry projects because forestry project activities can be initiated for multiple (and potentially competing) aims, such as carbon sequestration and biodiversity. Thus, projects that are in the “top 20%” for carbon sequestration purposes may score much lower on biodiversity and sustainable development criteria. Moreover, data constraints and the site-specific nature of carbon uptake mean that this approach is not likely to be applicable often. However, there may be some A/R project activities where retaining the possibility of using an already-developed baseline may be useful in reducing the costs of baseline development. For example, one particular baseline value could be applied to many bundles of similar small-scale activities that are undertaken in adjacent or nearby areas, such as the Scolel Té AIJ project. Nevertheless, if this option for baseline approaches is retained, the similar circumstances would need to include mention of e.g. climate, species planted, site management, socio-cultural and land ownership factors. The original wording would also need to be changed to take the carbon uptake of A/R activities into account.

3) Modifying approaches (a) and (b) (above) to make them more forward-looking. Two of the three baseline approaches agreed for emission reduction CDM projects are based either on a snapshot of the present, or an indication of what happened in the recent past. This can be entirely appropriate for emission reduction projects, as this reflects slow capital stock turnover in many sectors, especially energy, so the GHG emissions intensity would not be expected to improve, and may even worsen, in the absence of the project activity. It could also be appropriate for certain A/R projects, where land use, carbon stocks (and any emissions) on the project have been constant for several years and are expected to remain so for the crediting life of the A/R project.

However, in some circumstances C stocks can change naturally over time. This can occur e.g. via natural regeneration, as reflected in the baselines used in the Sumitomo project. Thus, baselines for A/R activities may be better if based on forward-looking criteria (such as expected rates of change) rather than on a single snapshot of carbon stocks. This would not necessarily complicate the baseline-setting process for A/R projects on sites where both historical and projected uptake and emissions are expected to remain constant, as a snapshot of carbon stocks and emissions could still be used to estimate the baseline. However, it would render the baselines of other A/R projects, where carbon stocks are expected to change in the future, more credible.

4) Defining the baseline in terms of **a likely and/or economically attractive prospective land use** at the time the project starts.

Identifying the most likely prospective land use (and associated carbon stocks) of a project site over a project’s crediting lifetime would give a good indication of what the trend in carbon stocks and emissions would be. For example, if reforestation or afforestation activities were a likely option, a proposed CDM project activity would presumably be eliminated on additionality grounds.

Determining the future land use on a project site has been an important part of setting the baseline level for many of the A/R projects examined in this paper. It could also play a major role in determining the baseline level of future CDM A/R project activities as it can help to identify potential free-rider project activities. Assessing the most likely prospective land use over the lifetime of the project can also help to identify any leakage associated with a project (e.g. through activity displacement) and therefore reduce the number of non-additional credits generated by a project.

Thus, equating the baseline with a likely prospective land use could be a promising start in defining the level of a project baseline. However, as for the definition of “baseline”, a caveat may be needed to indicate that the definition of baseline approach does not allow credits to be generated for ineligible LULUCF activities (as discussed above). Further modifications would also be needed to take into account that baseline carbon stocks (and emissions) can change over the lifetime of an A/R project even if the land-use category does not. For example, a clarification in this approach that carbon stock changes from natural regeneration (or degeneration) are included in the definition of “land use” will help to ensure that the credits generated by projects are not systematically overestimated (or underestimated).

5. Leakage

The Marrakech Accords' definition of leakage for emission reduction CDM projects is "the net change of anthropogenic emissions by sources of greenhouse gases which occurs outside the project boundary, and which is measurable and attributable to the CDM project activity".

Leakage can occur if an A/R project activity causes emissions to increase and/or removals to decrease outside the spatial, accounting and/or temporal boundary that is used to define the GHG benefits of the project activity. Where leakage occurs, it would mean that the environmental effect of a project is different (less or more) than the number of CERs it generates. There are several potential causes of leakage, including if an A/R project activity:

1. is undertaken in place of an alternative A/R project activity. An example of this would be if a country reduced its domestic re/afforestation programmes because of external investment in A/R CDM projects.
2. increases deforestation rates elsewhere.
3. displaces, rather than reduces, some baseline emissions. For example, although a project activity may reduce emissions from livestock grazing on the project site, these livestock and emissions may just be displaced elsewhere.
4. does not include all carbon pools (or emission sources) in its baseline, and some of the excluded carbon pools decrease (or emissions increase) during the crediting lifetime of the project.
5. increases emissions and/or reduces sequestration during part of the project's life (e.g. during site preparation and planting), but does not subtract these emission "disbenefits" from the subsequent emission benefits of the project.

The first two types of leakage are difficult to identify and quantify, but potentially the most serious, as they could lead to credits being generated for no net environmental benefit (i.e. 100% leakage). Moreover, they are not necessarily under the control of the project developer.

The first type of leakage could be addressed in a general sense by the host country's assessment that the CDM project activity contributed to sustainable development²⁰. Identifying the drivers for deforestation on or around the project site, and trying to address these, could reduce the second type of leakage. However, it would be impractical to require that a particular A/R project activity monitors for increased deforestation activities in general (as this could occur at a local, regional or even global scale). Nevertheless, such monitoring could reasonably be carried out on lands adjacent to the project site during the crediting lifetime of the project.

The latter three types of leakage are more local in scale, and are also factors that could be controlled by the project developer. The third type of leakage could occur if a project displaces inhabitants and/or livestock, and associated emissions. Some of the A/R projects examined involve the displacement or resettlement of

²⁰ Nevertheless, distinguishing the effects of individual projects from normal annual variations could be difficult because of the scale and historical year-to-year variation in A/R rates in some countries. For example, afforestation rates in India oscillated between 928000 and 1062000 ha between financial years 1992 and 1995 (Ministry of Environment and Forests, undated)

people (Kilombero, Romania) or of agricultural activities (Peugeot, Guaraqueçaba). Thus, while emissions may be reduced (and sequestration increased) on the project site, there is no guarantee that e.g. the livestock displaced are not grazing elsewhere. It is difficult to quantify the likely importance of this type of leakage, as it can vary depending on the type and intensity of land-use before and during the A/R project activity.

Excluding emission sources or some carbon pools from a project baseline could also result in projects generating more credits than their environmental benefit. For example, re/afforestation of pasture can decrease soil carbon in the first decade of a project (Laclau 2003, Paul et al. 2002), although the dynamics of soil organic carbon gain/loss can vary depending on the environmental conditions and silvicultural practices of a site (Zinn et al. 2002) and on species planted (Paul et al. 2002). Thus, while excluding e.g. soil carbon from a project baseline may not lead to negative leakage (and may lead to positive leakage), and could be an appropriate way to reduce monitoring costs, indications should be given why excluding this pool is appropriate.

The fifth type of leakage (“temporal leakage”) could occur if the crediting life of a project was chosen so as to exclude any negative GHG impacts of the project (e.g. through reductions in soil carbon at the beginning of the project, or through soil preparation and planting). Initial reductions in soil carbon stocks following afforestation can be significant: up to 2.4% loss per year for plantations of the commonly-used *Radiata* pine (Paul et al. 2002). Some A/R projects have indicated that small emission disbenefits are expected in early years (e.g. SaskPower, Plantar). However, the effects are insignificant compared to the total carbon sequestration by the projects. Therefore, although this type of leakage may not be important in all project types, it could easily be addressed by starting the crediting period of the project at the time of land preparation and planting, when any GHG disbenefits of the project are at their most significant.

Some analysis has been done on assessing and adjusting for leakage from LULUCF projects. However, this analysis tends to focus on the case of avoided deforestation projects (e.g. Brown et al. 2000, Chomitz 2002, Murray et al. 2002, Auckland et al. 2003) rather than A/R projects. Moreover, there is no agreement on the magnitude of potential leakage from A/R projects, or even on whether such leakage is likely to be more or less significant than that for emission reduction projects. While Chomitz (2002) indicates that there are no systematic differences between emission reduction and LULUCF projects, a review of different top-down leakage analyses for plantations in Schwarze et al. (2002) indicates that leakage potential for A/R projects could vary between “non-negligible” and 100%.

Some implications for A/R CDM project activities can be drawn from the analyses above, i.e. that:

- Different project activities - even of the same project category - are likely to have different leakage potential, depending on project- and site-specific factors such as whether there are competing uses for the project activity land or not.
- There is potential for positive leakage (“spillover”) as well as negative leakage from A/R project activities.
- Monitoring “key indicators” that drive land-use patterns or management can help determine whether a project has displaced, rather than reduced or substituted for, particular emission-producing activities.
- Integrating a potential CDM project into the local project context (e.g. local community needs, local environmental issues) is likely to reduce the extent of leakage.

Some analysis (Schwarze et al. 2002) has indicated that leakage effects from A/R projects are likely to be felt predominantly at the local scale. The only exception to this is for commercial plantations, where both local and global effects could be important.

5.1 Assessing leakage for current A/R projects

Table 6 indicates how leakage was taken into account for selected A/R projects. Significant work has been done to estimate the causes of leakage, and to reduce these drivers, in several projects (e.g. Guaraqueçaba, Romania, Sumitomo). Work has focused on the latter three types of leakage identified above. Some projects did not expect leakage to be important (e.g. Plantar, SaskPower). However, in projects where leakage is expected to occur, only the Kilombero project has quantified the likely extent (SGS 2000a).

Table 6: Summary of leakage assessments for selected A/R projects

Project name	Project boundary	Leakage assessment
Guaraqueçaba	Above-ground biomass.	Leakage drivers analysed - programme to improve buffalo management on neighbouring lands to be carried out. Leakage assessments will continue to be made throughout project life.
Kilombero	Above-ground biomass	5% of total expected carbon uptake of project to be kept in a "buffer" for 99 years to ensure against leakage.
Plantar	Above-ground carbon stocks in plantations and cerrado. Fossil fuel used in plantation development and management.	No leakage expected, as project is only on Plantar-owned lands. However, to be conservative, it is assumed that the existing plantations will be harvested.
PROFAFOR	Not indicated	Leakage avoidance strategies identified, e.g. avoid pasture and agricultural use of land within plantation boundaries, allow selective felling, and place projects near highways.
Romania	Above-ground biomass, roots, litter, soil, emissions from fossil fuels used in project implementation (0.05% of total C-eq. impacts).	Leakage risks identified in baseline report. No activity-shifting leakage expected, but illegal felling is likely and will be monitored/controlled. Land owner pledges to maintain afforestation at current rate as well as undertaking project.
SaskPower	Above and below-ground biomass. Soil C excluded (with initial monitoring to check it is not a source).	Not quantified as expected to be unimportant: project site has no competing land uses. Project assumes replanting after harvest and that carbon debits should be generated on harvest.
Scolec Té	Above and below-ground biomass, soil C, carbon contained in HWP.	
SIF	(above-ground biomass, roots, and dead organic matter). HWP excluded.	No leakage expected: legal and contractual requirements to replant within three years of harvesting.
Sumitomo	N/a	Leakage drivers assessed via questionnaire to local population. Drivers assessed as forest clearance for cultivation, legal and illegal felling and use of timber. Expected leakage not quantified.
Viet Nam	Stem wood only.	The project occurs on a small area and no leakage is expected. However, benefits may be much less as no infrastructure in place to ensure seeds produced by project are planted.

Sources: As for Table 1

5.2 Defining “leakage” for A/R projects

Country submissions have identified several options how to define and adjust for leakage for A/R CDM projects (UNFCCC 2003a and b). These differ in respect to whether:

1. to include the effects of both positive and negative leakage;
2. whether to assess leakage for both emissions and/or removals;
3. to include particular examples of potential sources of leakage into the leakage definition.

Leakage occurs by definition outside the project boundary. However, what is inside the project boundary, and what is outside, depends on the definitions of both baselines and project boundaries. Different definitions of baselines and boundaries could exclude some or all of the negative or positive sources of leakage that could be associated with a particular A/R project, e.g.:

- emissions from fossil fuel combustion (e.g. for irrigation, harvesting) and/or fertiliser application and use;
- emissions that arise from soil disturbance in site preparation and planting;
- emissions from deforestation elsewhere increasing, or removals from other afforestation or reforestation activities elsewhere decreasing, as a result of the project;
- emissions previously occurring on the project site (e.g. from livestock, agriculture) being displaced elsewhere because of the project;
- removals decreasing elsewhere as a result of the project (e.g. not going ahead with alternative projects)
- emissions from deforestation elsewhere decreasing (positive leakage) as a result of the project, e.g. if increased availability of plantation wood results in lower harvesting of natural forests;
- increased uptake of A/R activities outside the project boundary (positive leakage) brought about e.g. by increased awareness of CDM-eligible activities and their potential economic benefits.

Some of these emissions or removals are easier to identify and quantify than others. The significance of different sources or removals is likely to vary between different projects and project types, as well as over the life of a project – so not all will need to be assessed for each project. For example, emissions from the use of fossil fuels are likely to be relatively easy to estimate, and they can be relatively significant, particularly in the early years of a CDM project, when sequestration is slow. However, they are likely to be relatively small over the life of the project. For example, emissions from petrol use from the A/R component of the PCF’s Plantar project are 4439 t CO₂/y. This is equivalent to 2.1% of the carbon benefits generated by the plantations over the first 21 years of the project and approximately half the gross carbon uptake by plantations in the project’s first year. Emissions from fossil fuel use in the project would be included in the baseline under some of the possible definitions examined in section 4.

Other potential sources of leakage that are related to GHG emissions that occurred on the project site either prior to implementing the project activity (e.g. from agriculture), or during site preparation, should also be straightforward to identify and quantify.

However, other potential sources of leakage are not likely to be included in any of the possible definitions of baseline, and may also be difficult to quantify. This may particularly be the case for either positive or negative leakage that is attributable, but not directly attributable, to the project activity. For example, a baseline for an A/R project based on trends in land use and/or changes in carbon stocks on a particular site will not include assessments of re/afforestation or deforestation rates elsewhere in the project-site country or region. If leakage assessment includes requiring whether deforestation outside the project boundary decreases as a result of the project, it would increase the data (and cost) needed for project development.

Table 7 shows which potential types of leakage for A/R projects would be included and excluded in different potential definitions of leakage and outlines the implications of including different types in the definition of leakage. For example, limiting the definition to include emissions (not removals) would avoid having to assess some – but not all – factors that would be difficult to estimate, such as a change in deforestation rates outside the project boundary. Alternatively, defining leakage to include only factors that were directly attributable to the project would make estimating leakage easier, although it could also exclude some factors that were potentially significant (but not under the control of the project developer). Thus, how leakage is defined could have a significant impact on the number of CDM A/R projects because the definition impacts the ease and cost of estimating leakage, which will in turn affect the total transaction costs associated with the project.

Table 7: Characteristics of potential types of leakage from A/R projects

Factor:	Emission (E) or removal (R)?	Positive (+ve) or negative (-ve) leakage?	Directly or indirectly attributable to project?	Geographical scale?	Ease of measurement/estimation (High, Medium, Low)	Could baseline be defined to include issue?	Possible significance compared to project removals.	Can the factor be controlled by the project developer?
On-site fossil fuel combustion (e.g. for irrigation, harvesting)	E	-ve	Direct	Local	H	Yes	L	Yes
On-site fertiliser application and use	E	-ve	Direct	Local	M	Yes	L-M	Yes
On-site soil disturbance (e.g. from planting)	E	-ve	Direct	Local	M-L	No	L	Yes
Exclusion of some C pools	R or E	+ve or -ve	Direct	Local	M	Yes	L-H	Yes
Displacement of some emission sources	E	-ve	Direct	Local/ Regional	M-L	Yes	L-M	Sometimes (e.g. via choice of project location).
Use as (long-lived) harvested wood products (HWP)	R	+ve	Indirect or Direct	Local to global	L	No	L-M	No
Processing of HWP	E	-ve	Indirect or direct	Local to global	M-L	No	L	Sometimes (if production of HWP part of project)
Change in A/R rates elsewhere	R	+ve or -ve	Indirect or direct	Local to global	L	No	M-H	No
Change in D rates elsewhere	E	+ve or -ve	Indirect or direct	Local to global	L	No	M-H	No

(rating based on author's judgement)

6. Conclusions

LULUCF activities can remove CO₂ from the atmosphere and can thus help mitigate greenhouse gas emissions. The Marrakech Accords confirmed that the benefits of re/afforestation (A/R) activities in non-Annex I countries could be used by Annex I Parties to the Kyoto Protocol to offset their domestic GHG emissions, up to a cap equal to 1% of base year emissions times five²¹. The MA also indicated that any LULUCF project activities should be governed by the principle of contributing to the conservation of biodiversity and the sustainable use of natural resources. Agreement on modalities for how to incorporate A/R activities into the CDM during the first commitment period is meant to be reached by COP9 (December 2003) and to reflect the modalities agreed at COP7 on emission reduction projects in the CDM.

There are inherent differences between A/R projects and emission reduction projects. These include that carbon removals by A/R projects is not necessarily permanent, and that changes in carbon removals can occur in the absence of direct human intervention, e.g. via natural regeneration. Another difference is the scale of emission reduction and A/R activities that are undertaken under BAU activities. For example, the scale of inherently GHG-friendly renewable electricity generation (other than hydro) is very low in non-Annex I countries, accounting for an average 0.7% of electricity generation in Latin America, Asia, Africa and the Middle East. In contrast, business-as-usual A/R activities in non-Annex I countries is undertaken on a large scale: 4.5 million hectares per year. Re/afforesting an area this size annually could sequester up to 890 million tons of CO₂ by 2012.

Several pilot A/R projects have already been initiated and are very diverse. They include small-scale agro-forestry projects, larger-scale projects aiming to re-establish natural forests, and large-scale commercial plantation establishment. This latter project type, which also involves harvesting, accounts for the majority of the area; the other project types, including re-establishing natural forest ecosystems, has only been done on a smaller scale²². Considerable variation exists between the different projects in the types of stakeholders involved, whether the project is a commercial undertaking, and what project outputs were expected (e.g. just wood/wood products, or also non-timber forest products). Finally, large variations also exist in the impact of different projects on biodiversity, other environmental aspects, and on the socio-economic welfare of local populations.

Assessing additionality

Examining the limited experience with implementing the Marrakech Accords' definition of additionality for emission reduction projects shows that this definition has been interpreted in different ways by different project developers. Some have taken the MA definition to mean "an additional project is one that would not be implemented in the absence of the CDM". Others have interpreted the same definition as "if the proposed project activity had not been implemented, a less GHG-friendly project activity would have been initiated in its place". This second interpretation does not question whether the project would have gone ahead in the absence of the CDM. Its use has led to some projects already under construction or in operation (e.g. large hydro projects or commercial charcoal-based steel producers) being submitted by their developers as additional projects that generate GHG benefits.

If the second interpretation of additionality is used for A/R projects, business-as-usual A/R activities could (without the cap) generate up to 890 million CERs by 2012 if all these BAU activities occurred on CDM-

²¹ This equals 424 mt CO₂ for current Annex I Parties plus Russia.

²² Several projects examined did, however, include forest preservation components. However, these were not examined in further detail as they are not eligible for the CDM during the first commitment period.

eligible land and sought CDM status. This is because, by definition, an A/R project activity will remove more GHG from the atmosphere than no A/R project activity. Thus, free-rider (BAU) A/R projects could in theory generate credits up to the level of the cap agreed at COP7, and thereby undermine the long-term credibility of LULUCF projects in the CDM.

To safeguard against this outcome, and to account for the differences between emission reduction and A/R CDM project activities, the definitions of additionality, baselines and leakage agreed for emission reduction CDM projects at COP7 will need to be modified for A/R project activities. Any definitions to be agreed for A/R CDM project activities will either need to be broad enough to be applied to the gamut of eligible A/R activities, or separate definitions will be needed for a particular sub-set of project types. This will require some modifications to the definitions agreed for emission reduction projects.

A/R projects currently underway – most of which plan to apply for CDM status - used different means by which to indicate their additionality (although not all projects indicated why they were additional). The two most common means could be classified either as a “persuasive argument” or financial/economic reasoning. The former presents reasoning along the lines that there are current deforestation trends, so – for example - it is unlikely that area used as pasture would be reforested in the absence of the project. The latter lays out why the project would not be financially attractive in the absence of carbon credits.

Assessing whether a proposed A/R CDM project activity is both eligible and additional will need to take into account that:

- Afforestation and reforestation activities are implemented for commercial, environmental or other reasons, and on a large scale in many countries during business-as-usual activities;
- A/R project activities can result in both carbon uptake and GHG emissions, both of which need to be monitored and reported as part of project performance;
- Changes (positive or negative) in carbon stocks and uptake rates on land can occur in the absence of human intervention, e.g. via natural regeneration, and these trends need to be accounted for in the baseline;
- A/R CDM project activities are required to have multiple goals (mitigating GHG emissions, contributing to sustainable development; conservation of biodiversity and natural resources), and there will be a trade-off - and associated cost - with balancing these criteria.

Assuming that the biodiversity and sustainable development criteria are reiterated elsewhere in the decision text on including A/R in the CDM, the remaining factors could be taken into account by modifying the current definition of additionality (elaborated for emission reduction projects) in the Marrakech Accords.

Implementing a revised definition of additionality that takes into account the criteria outlined above would require additionality tests or screens as well as assessing a project’s additionality by comparing its performance with the project’s baseline, as all A/R activities should result in net sequestration on the project site. A revised definition could also help to reduce the potential number of free riders. However, given the variety of potential A/R project types, locations and participants that are involved in BAU A/R activities, there is likely to be no single, simple adequate “test” to determine whether or not a particular project is additional and whether or not it meets biodiversity and sustainability criteria.

Assessing additionality based on a mixture of non-carbon and non-financial criteria may therefore be an option worth examining further for A/R projects. In particular, it could increase transparency and consistency, as these criteria are often ones that can be verified objectively. Such criteria could include

project size, number of species planted, proportion of native species planted, whether the project developer is the sole beneficiary of project outputs and whether the project increases access by the local population to non-timber forest products (see Table 4). Alternatively, different project types could be classified as high, medium or low-impact projects, and different additionality screens applied to each. For either approach, the exact criteria (which may vary in different contexts) would require further detailed examination.

Another possibility would be to put the onus on the project developer to explain why their project is additional, e.g. in the form of a short “persuasive argument”. Such a requirement could either be put in the additionality definition, or included elsewhere in the modalities. While such an argument would be subjective, it could also provide convincing indications of project additionality if it showed that the proposed project activity was significantly different to BAU A/R rates or project types.

Establishing baselines

Looking across the data from current A/R projects, there was a general similarity in the methods used to calculate the baseline - although the actual levels varied significantly from site to site. The carbon uptake baselines used for these A/R projects were predominantly either based on trends in carbon stocks and/or land-use change. In many cases this led to a simple baseline of constant carbon stocks or a constant change in carbon stocks, although in one case a model was used. Natural regeneration was generally assumed not to occur for afforestation projects, but was factored into the project baseline for a reforestation project. Verifying that this is an appropriate assumption for reforestation projects is likely to need a project-specific assessment.

The baseline for one project assumed that, with a continuation of current land-use trends, plantations would be harvested and not replanted, i.e. that the baseline carbon stock declined over the first few years of the project. Using a baseline where carbon stocks decline could allow the A/R project activity to generate emission credits for activities that are neither afforestation nor reforestation, unless (as in this case) the “with project” scenario also assumes a similar anthropogenic reduction in carbon stocks. A simple means to ensure that A/R projects do not generate credits for ineligible LULUCF activities would be to exclude from the baseline any reduction in carbon stocks that occur via anthropogenic degradation.

When modifying the definition of “baseline” for A/R project activities, the following factors could usefully be taken into account:

- Naturally-occurring changes in carbon stocks and uptake can occur on a project site (as noted above);
- A/R activities may increase emissions on the project site (e.g. through use of fuels for irrigation or planting) as well as increasing sequestration.
- The baseline can be defined in such a way as to reiterate that LULUCF CDM projects cannot generate credits for ineligible LULUCF activities.
- The possibility of a project activity displacing current land uses (and associated emissions and/or removals) in general could be considered as part of the leakage adjustment.

The number and definition of “baseline approaches” for A/R projects also needs to be determined. Any baseline approach should ensure that approved baseline approaches are based on forward-looking, rather than backward-looking, criteria (as well as incorporating the factors mentioned above for the baseline definition).

Identifying the most likely prospective land use (and associated trend in carbon stocks and emissions) at the time the project starts could be a promising approach in defining a project baseline. This approach would need to be worded carefully to ensure that such a definition does not allow credits to be generated for ineligible LULUCF activities or for natural regeneration.

Managing leakage

There are several different possible types of leakage that could occur in forestry projects. They can involve emissions or removals, positive or negative leakage, occur at a local or global scale, be easy or difficult to quantify, be relatively significant or not, and be under the control of the project proponents or not. The types of leakage that are under the control of the project developer (i.e. activity displacement, incomplete accounting, temporal leakage) can be reduced or eliminated by appropriate project design and/or implementation. For example, the causes of local activity displacement could be addressed and/or their magnitude estimated, all carbon pools that decrease (and emission sources that increase) could be included in the project's baseline, and the crediting lifetime of the project could start at the time of site preparation and planting.

Defining leakage to include only factors that were directly attributable to the project would make estimating leakage easier, although it could also exclude some factors that were potentially significant (but not under the control of the project developer). Thus, how leakage is defined could have a significant impact on the number of CDM A/R projects because the definition impacts the ease and cost of estimating leakage.

Given the relatively recent implementation of many A/R CDM-type projects, there is little actual experience with quantifying the leakage expected from projects. However, several projects underway have undertaken a thorough study of the "key indicators" that cause leakage, and have designed the project in order to reduce possible leakage effects. Only one A/R project examined has quantified the potential leakage effects (at 5% of total carbon uptake). Further developing such methodologies would be helpful to ensure consistency and transparency between different projects.

This paper has highlighted the potential risk of significant levels of free riders for CDM A/R projects. The risk of free riders and the importance of leakage can be significantly reduced by incorporating relatively small changes into the definitions of additionality, baseline and baseline approach that are set to be agreed at COP9. Doing this would help to ensure the environmental integrity of the A/R CDM without burdening A/R projects with excessive costs.

7. Appendix A: Excerpt from Decision 17/CP.7

REPORT OF THE CONFERENCES OF THE PARTIES ON ITS SEVENTH SESSION, HELD AT MARRAKESH FROM 29 OCTOBER TO 10 NOVEMBER 2001

Addendum

PART TWO: ACTION TAKEN BY THE CONFERENCES BY THE PARTIES

Volume II

DECISION 17/CP.7:

Modalities and procedures for a clean development mechanism, as defined in Article 12 of the Kyoto Protocol (Paragraphs 43-52)

[...]

43. A CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity.

44. The baseline for a CDM project activity is the scenario that reasonably represents the anthropogenic emissions by sources of greenhouse gases that would occur in the absence of the proposed project activity. A baseline shall cover emissions from all gases, sectors and source categories listed in Annex A within the project boundary. A baseline shall be deemed to reasonably represent the anthropogenic emissions by sources that would occur in the absence of the proposed project activity if it is derived using a baseline methodology referred to in paragraphs 37 and 38 above.

45. A baseline shall be established:

(a) By project participants in accordance with provisions for the use of approved and new methodologies, contained in decision 17/CP.7, the present annex and relevant decisions of the COP/MOP;

(b) In a transparent and conservative manner regarding the choice of approaches, assumptions, methodologies, parameters, data sources, key factors and additionality, and taking into account uncertainty;

(c) On a project-specific basis;

(d) In the case of small-scale CDM project activities which meet the criteria specified in decision 17/CP.7 and relevant decisions by the COP/MOP, in accordance with simplified procedures developed for such activities;

(e) Taking into account relevant national and/or sectoral policies and circumstances, such as sectoral reform initiatives, local fuel availability, power sector expansion plans, and the economic situation in the project sector.

46. The baseline may include a scenario where future anthropogenic emissions by sources are projected to rise above current levels, due to the specific circumstances of the host Party.

47. The baseline shall be defined in a way that CERs cannot be earned for decreases in activity levels outside the project activity or due to *force majeure*.

48. In choosing a baseline methodology for a project activity, project participants shall select from among the following approaches the one deemed most appropriate for the project activity, taking into account any guidance by the executive board, and justify the appropriateness of their choice:

(a) Existing actual or historical emissions, as applicable; or

(b) Emissions from a technology that represents an economically attractive course of action, taking into account barriers to investment; or

(c) The average emissions of similar project activities undertaken in the previous five years, in similar social, economic, environmental and technological circumstances, and whose performance is among the top 20 per cent of their category.

49. Project participants shall select a crediting period for a proposed project activity from one of the following alternative approaches:

(a) A maximum of seven years which may be renewed at most two times, provided that, for each renewal, a designated operational entity determines and informs the executive board that the original project baseline is still valid or has been updated taking account of new data where applicable; or

(b) A maximum of ten years with no option of renewal.

50. Reductions in anthropogenic emissions by sources shall be adjusted for leakage in accordance with the monitoring and verification provisions in paragraphs 59 and 62(f) below, respectively.

51. Leakage is defined as the net change of anthropogenic emissions by sources of greenhouse gases which occurs outside the project boundary, and which is measurable and attributable to the CDM project activity.

52. The project boundary shall encompass all anthropogenic emissions by sources of greenhouse gases under the control of the project participants that are significant and reasonably attributable to the CDM project activity.

[...]

Source: FCCC/CP/2001/13/Add.2, pages 36-37

8. References

- AES, 2002, *Bujagali Hydroelectric Project - baseline report*, <http://www.senter.nl/asp/page.asp?id=i001296&alias=erupt>
- AES Panama, 2002, *Esti Hydroelectric Project - baseline report*, <http://www.senter.nl/asp/page.asp?id=i001293&alias=erupt>
- AES Panama, 2002, *Bayano Hydroelectric Project - baseline report*, <http://www.senter.nl/asp/page.asp?id=i001294&alias=erupt>
- Aukland, Louise, Pedro Moura Costa, Sandra Brown, 2003 (in press), *A conceptual framework and its application for addressing leakage: the case of avoided deforestation*, *Climate Policy* **94** (2003) 1-14
- Baethgan, Walter, 2003 personal communication
- Boer, Rizaldi, 2001, *CDM-Agroforestry Projects and sustainable development: Indonesian case*, Paper for Workshop on Sustainable Development Indicators, Chinese Taipei, November 2001, <http://www.sarcs.org/documents/R%20Boer.pdf>
- Brown, Sandra and Matt Delaney, 2001, *Guaraqueçaba Climate Action Project: 2000 Findings and Status Report*
- Brown, Sandra, Omar Masera and Jayant Sathaye, 2000, 'Project-Based Activities', in *Land use, Land-use change and Forestry*, IPCC Special Report, Cambridge, UK
- Busch Christopher, Jayant Sathaye, Arturo Sanchez-Azofeifa, 2000, *Estimating the Greenhouse Gas Benefits of Forestry Projects: A Costa Rican Case Study*, LBNL-42289
- CBD, 2002, *Forest Biological Diversity: Summary Report of the Workshop on Forests and Biological Diversity held in Accra from 28-30 January 2002*, UNEP/CBD/COP/6/17/Add.3, <http://www.biodiv.org>
- CBD, 2001, *Report of the Ad Hoc Technical Expert Group on Forest Biological Diversity*, UNEP/CBD/SBSTTA/7/6, <http://www.biodiv.org>
- CDMWatch, 2003, *Projects seeking, or intending to seek, CDM registration as of April 24, 2003*, <http://www.cdmwatch.org> (accessed 28.4.2003)
- Chomitz, Kenneth M, 2002, *Baseline, leakage and measurement issues: how do forestry and energy projects compare?*, *Climate Policy* **2** (2002) 35-49
- DNV, 2001, *Validation Report Prototype Carbon Fund: Validation of the Plantar Project*, Report number 2001-1263, <http://www.prototypecarbonfund.org/>
- Ecosecurities, 2002, *Clean Development Mechanism Project Design Document - V&M do Brasil Fuel Switch Project*, <http://www.dnv.com/certification/ClimateChange/>
- FAO, 2001, *State of the World's Forests 2001*, <http://www.fao.org>
- FAO, 2000, *Plantation Areas 2000* (web page per country), <http://www.fao.org/forestry/fo/country>
- FSC, 2000, *FSC Principles and Criteria*, <http://www.fscoax.org/principal.htm>
- GERT, 2002, *Saskatchewan Environment and Resource Management - Saskatchewan Power Corporation Forestry Sequestration Project - Technical Committee Review Report*

COM/ENV/EPOC/IEA/SLT(2003)1

GERT, 2002b, *Lessons Learned Report: Saskatchewan Forest Sequestration Project*, Greenhouse Gas Emissions Reduction Trading Pilot.

Golodet, Michelle, 14.1.2003, Personal Communication

IEA, 2002, *Energy Balances of Non-OECD Countries*, Paris.

Jara, Luis Fernando, 2002, *Aspectos Ambientales y Sociales de los Proyectos de Profafor S.A.*, presentation at IUCN/UNEP/FAO workshop in Quito, Ecuador, 2-4 October

Kartha, S. and M. Lazarus with M. Bosi, 2002, *Practical Baseline Recommendations for Greenhouse Gas Mitigation Projects in the Electric Power Sector*, OECD and IEA Information Paper, Paris, <http://www.oecd.org/env/cc/>

Laclau, Pablo, 2003 (in press), *Biomass and carbon sequestration of ponderosa pine plantations and native cypress forests in northwest Patagonia*, Forest Ecology and Management 6175 (2003) 1-17

Ministry of Environment and Forests, India, undated, *Afforestation/Tree Plantation Activities under 20 Points Programme*, <http://envfor.nic.in/naeb>, (accessed 15.1.2003)

MoF (Ministry of Finance, India), 2002, *Union Budget 2002-3*, <http://indiabudget.nic.in/ub2002-03/eb/>

Murray, Brian C, Bruce A McCarl, Heng-Chi Lee, 2002, *Estimating Leakage from Forest Carbon Sequestration Programs*, RTI International Working Paper 02 06

Newton, A. C and V. Kapos, 2002, *Biodiversity indicators in national forest inventories*, Unasylva **53** number 210, <http://www.fao.org/DOCREP/005/Y4001E/Y4001E00.htm#TopOfPage>

OECD/IEA, 2000, *Emission Baselines: Estimating the Unknown*, Paris

Paul, K I, P J Polglase, J G Nyakuengama and P K Khanna, 2002, *Change in soil carbon following afforestation*, Forest Ecology and Management **168**, Volumes 1-3, September 2002

PCF, 2002a, *Baseline determination for Plantar: Evaluation of the emissions reduction potential of the Plantar project*, <http://www.prototypecarbonfund.org/>

PCF, 2002b, *Romania: Afforestation of Degraded Agricultural Land Project: Project Design Document*, <http://www.prototypecarbonfund.org/>

PCF, 2002c, *Romania Afforestation of Degraded Agricultural Land Project: Baseline Study, Emission Reductions Projection and Monitoring Plans*, prepared by Sandra Brown, Henry Philips, Malina Voicu, Ioan Abrudan, Viorel Bludjea, Ciprian Pahontu, Vasilij Kostyushin, <http://www.prototypecarbonfund.org/>

PlanVivo, 2001, *Subtropical forest restoration: technical specification* http://www.eccm.uk.com/scolelte/documents/subtropical_forest_restoration.pdf

SGS, 2002, *LULUCF projects in the CDM: Accounting regimes and proposals for simplified rules and modalities* IETA Discussion paper 02-02, http://www.ieta.org/Documents/Discussion_Papers/IETA_discussion_paper_0202.PDF

SGS, 2000a, *Kilombero Forests Limited, GHG Project Verification and Certification - Executive Summary*, <http://www.sgs.nl/nl/icm/agro/cov.html>

SGS, 2000b, *Profafor (Programa Face de Forestación), GHG Project Verification and Certification - Executive Summary*, <http://www.sgs.nl/nl/icm/agro/cov.html>

- Subak, Susan, 2002, *Forest certification eligibility as a screen for CDM sinks projects*, Climate Policy December 2002, 2, issue 4
- Subak, Susan, 1999, *Forest Protection and Reforestation in Costa Rica: Evaluation of a Clean Development Mechanism Prototype*
- Sumitomo Forestry Co., 2001, *Forest Plantation Project in Indonesia*, Presentation at the 11th Asian-Pacific Seminar on Climate Change, Kitakyushu, Japan, August 2001, http://www.ap-net.org/apseminar/docs/22_Suzuki.pdf
- SVPS and TNC, 2002, *Proceedings of the Guaraqueçaba Leakage Workshop, May 2001*
- Tipper, Richard, Rebecca Carr and William McGhee, 2002, *Guidance on Baselines Methodologies and Crediting Periods for LULUCF Projects in the CDM*, prepared for the UK Department for Environment, Food and Rural Affairs
- Tipper, Richard, William McGhee, Jane Ellis, Ben H. de Jong, Augustine Hellier, 2001, *An Initial View on Methodologies for Emission Baselines: Forestry Case Study* (unpublished - draft presented at March 2001 AIXG)
- UNFCCC, 2003a, *Land Use, Land-use change and Forestry: Definitions and Modalities for Including Afforestation and Reforestation Activities under Article 12 of the Kyoto Protocol in the First Commitment Period: Options Paper on modalities for addressing baselines, additionality and leakage*, FCCC/SBSTA/2003/6, <http://unfccc.int/resource/docs/2003/sbsta/06.pdf>
- UNFCCC, 2003b, *Land Use, Land-use change and Forestry: Definitions and Modalities for Including Afforestation and Reforestation Activities under Article 12 of the Kyoto Protocol in the First Commitment Period: Draft Consolidated Text*, FCCC/SBSTA/2003/4, <http://unfccc.int/resource/docs/2003/sbsta/04.pdf>
- UNFCCC, 2002, *Clean Development Mechanism - Project Design Document version 01*, <http://unfccc.int/cdm/documents.html>
- UNFCCC, 2002b, *Uniform Reporting Format: Activities Implemented Jointly under the Pilot Phase, Scolec Té Project*, <http://unfccc.int/program/coop/aij/aijact/mexusa02.html>
- UNFCCC, 2002c, *Land Use, Land-use change and Forestry: Definitions and Modalities for Including Afforestation and Reforestation Activities under Article 12 of the Kyoto Protocol in the First Commitment Period: Submissions from Parties*, FCCC/SBSTA/2002/MISC.22 (and addendums), <http://unfccc.int/resource/docs/2002/sbsta/misc22.pdf>
- UNFCCC, 2002d, *Clean Development Mechanism Project Design Document, version 01*, <http://unfccc.int/cdm/Documents/cdmpdd.pdf>
- UNFCCC, 2002e, *Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories*, Appendix B to FCCC/CP/2002/7/Add.3, <http://unfccc.int/cdm/Documents/ssc%20docs/ssclistmeth.pdf>
- UNFCCC, 2001, *Uniform Reporting Format: Activities Implemented Jointly under the Pilot Phase, SIF Carbon Sequestration Project* <http://unfccc.int/program/coop/aij/aijact01/chlusa-01-01.html>
- UNFCCC, 2000, *Uniform Reporting Format: Activities Implemented Jointly under the Pilot Phase: Costa Rica/Norway Forestry Project* <http://unfccc.int/program/coop/aij/aijact01/crinor01-00.html>
- UNFCCC, 1998, *Uniform Reporting Format: Activities Implemented Jointly under the Pilot Phase: Klinki Forestry Project* <http://unfccc.int/program/coop/aij/aijact98/criusa07-98.html>
- WBCSD, 2000, *Clean Development Mechanism - Exploring for Solutions through learning-by-doing.*

COM/ENV/EPOC/IEA/SLT(2003)1

Zinn, Yuri, Simas Resck and José da Silva, 2002, *Soil organic carbon as affected by afforestation with Eucalyptus and Pinus in the Cerrado region of Brazil*, *Forest Ecology and Management*, **166**, Issues 1-3 (August 2002)

9. Glossary

A/R	Afforestation or reforestation
AIJ	Activities Implemented Jointly
AIXG	The OECD/IEA Annex I Expert Group on the UNFCCC
BAU	Business-as-usual
CBD	Convention on Biological Diversity
CDM	Clean Development Mechanism
CER	Certified Emission Reductions
CERUPT	The Dutch Government's tender scheme for CDM projects
CO ₂	Carbon dioxide
COP	Conference of the Parties
FSC	Forest Stewardship Council
GHG	Greenhouse gas
ha	hectare
HWP	Harvested wood products
IEA	International Energy Agency
IGOs	Inter-governmental organisations
LULUCF	Land use, land-use change and forestry
MA	Marrakech Accords
NAI	Non-Annex I Countries
NGO	Non-governmental organisation
NTFP	Non-timber forest product
OECD	Organisation for Economic Co-operation and Development
PCF	The World Bank's Prototype Carbon Fund
PDD	Project design document
UNFCCC	United Nations' Framework Convention on Climate Change